



FRIDAY, NOVEMBER 25.

NEWS OF THE WEEK.

We give below, in a condensed form, the leading news items of the week. These items will be found in detail in their appropriate columns.

Meetings Next Week.—Georgia Pacific.

Elections.—Chesapeake & Ohio, J. T. Odell, General Superintendent.—Chicago, St. Paul, Minneapolis & Omaha, W. A. Scott, General Superintendent.—Duluth, Red Wing & Southwestern, F. W. Hoyt, President.—Duluth & Iron Range, G. H. White, General Superintendent.—Fort Worth & Denver City, R. G. Duncan, General Superintendent.—Montgomery & Florida, N. T. Sprague, President.—Monadnock, Henry K. French, President.—New York Railroad Commission, Michael Rickard, Commissioner.—Pacific in Nebraska, Edward Barrington, General Superintendent.—Western Railway of Alabama, Cecil Gabbett, President.

New Companies Organized.—Chicago & Eastern files articles in Illinois.—Minnesota & Northern files articles in Minnesota.—Nashville & Charleston is chartered in Tennessee.—Newport & Yaquina is incorporated in Oregon.—St. Augustine & North Beach is incorporated in Florida.—St. Augustine & East Coast is chartered in Florida.—Visalia & Tulare is incorporated in California.

Changes and Extensions.—Duluth & Manitoba, from Thompson to Grassy Point, Minn., 12½ miles.—Montana: Montana Central is completed.—Wisconsin: Chicago, Madison & Northern is completed to Madison.

Traffic.—Cotton receipts, interior markets, for the week ending Nov. 18 show an increase of 24.3 per cent. as compared with the corresponding week last year; shipments show an increase of 15.7 per cent.; seaport receipts show an increase of 6.0 per cent.; exports an increase of 72.2 per cent.; cotton in sight is smaller than at the same date last year by 4.0 per cent.

Earnings.—For the month of September 22 roads report their gross earnings, 20 showing an increase and 2 a decrease. The net increase is 5.9 per cent.; 9 roads report gross and net earnings for September. The net decrease is 10.3 per cent. For the three months ending Sept. 30, 13 roads report gross and net earnings, 3 showing a decrease and 10 an increase; the net increase is 7.6 per cent. Nine roads report gross and net for the nine months ending Sept. 30, 2 showing a decrease in net for the ten months ending Oct. 31. Thirty-nine roads report their gross earnings, all showing an increase. The total net increase is 16.0 per cent.

Miscellaneous.—Flint & Pere Marquette purchases the Port Huron & Northwestern.—Kansas City & Sabine Pass files mortgage for \$2,485,000.

Contributions.**Rigid vs. Spring Frogs.**

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your editorial on "Roadmasters' Convention" in your issue of 28th ult., you say, "The effort of the committee on standard frogs to recommend the Association to a rigid frog for all places was promptly and properly defeated and a report was adopted in favor of spring rail frog for main track when ever practicable." As to the fact that the recommendation of the committee was defeated I do not question, but as to its being proper to do so I still doubt.

Nothing whatever was brought forward in the discussion to change the views which deterred me from making any allusion to the spring rail frog in the report to the Convention, namely, its uncertainty as a safe device. My objections to the spring frog were not grounded upon opinion, but were forcibly impressed upon my mind by actual experience on a road where they were adopted as the standard, and had to be finally discarded after a painful and expensive trial.

I have a vivid recollection of the time when I believed as strongly in the superiority of the spring rail frog as do any of the gentlemen who now advocate it, but experience, as I before remarked, convinced me beyond a doubt that the principle upon which it is constructed does not afford a sufficient margin of safety, in that a loose rail of any kind should not be a part of the main track, particularly so in this case, where it is so liable to break, weakened as it is by the necessary cutting away of flange, and resting, as it does, partly on an elastic and a rigid bearing (ties and plate).

The liability of a grooved wheel (that is a badly worn engine tire) forcing the wing rail out in passing from heel to point is in itself one of the greatest elements of danger, the remedy for which after a searching inquiry consisted of an "easement block," which is impracticable, and the removal of all such wheels from service, which is possible but by no means strictly practiced upon any of the roads that I am acquainted with. Furthermore, the lateral support which the throat of a rigid frog affords for the safe guidance of wheels is thrown entirely upon the guard rail of the spring frog, which must be at all times in proper position to withstand the lateral thrusts caused by irregularity in surface, line, etc. In view of these facts and as safety was the highest consideration of the committee, it was decided without a dissenting voice that our report should be strictly confined to the rigid frog.

Economy, in that it would outwear the average rigid frog without repairs, seemed to me the only feature that could be sustained; the difference, however, in that respect would ultimately amount to but very little, if any, under a proper sys-

tem of repairs, by having the parts made interchangeable, so that the right or left wing rail or any other part of the frog could be furnished on requisition to the section foreman, which he could replace, thereby avoiding the expense and trouble of sending it to the shop. I believe I have sufficiently set forth the reasons which actuated the committee in recommending the rigid frog.

ONE OF THE COMMITTEE.

Giving Information to Passengers.

TO THE EDITOR OF THE RAILROAD GAZETTE:

You sometimes take a go at the minor faults of the railroads, and properly enough. No man is less disposed to quarrel with them than I am, for they serve me well, but I like to have my friends tell me of my short-comings before my enemies see them, provided they don't nag me. Now I want to say a word about a common mistake of my friends, the railroads. It is little, but annoying. The other day I arrived in, say Skedunk, "very early in the morning," as your accident man says, bound west, with 15 minutes for the connection. My train out did not start on time, however, and I managed to extract from the train conductor the information that we were waiting for another train from the east, which was late, and that we might start in 20 minutes, or it might be an hour; in fact, we got off an hour and 20 minutes late. My criticism is this: It was perfectly possible to know that the train for which we waited was an hour late, and to let the passengers know it. Pains should have been taken to inform them. Then I should have taken a comfortable breakfast, smoked my cigar in the open air, walked about a little, and started out on my day's journey as fresh as a lark; instead of that I sat in a malodorous car in a gassy, noisy station, and started finally with my mind perturbed and my body unrefreshed. For the ladies, already half sick after a night on a sleeping car, the case was even worse. The moral I would draw is that the railroads will make money by treating their passengers like intelligent and discreet beings, and not like express packages or live-stock. I am sure that railroad men will find that the American public improves on acquaintance. It will be of no use for you to tell me that I am reasoning from one small official and one petty case. That conductor was a civil, smart fellow, and very likely has in him the making of a general manager. He and the incident were typical. I don't ask for general orders to officers and employees to tell all they know, but for a change of heart in the high places. Some of the spirit of the chief is sure to go through the whole corps.

AN OCCASIONAL DRUMMER.

The Railroad College.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I request permission to make a few supplementary remarks to my article on the education of railroad employes, published in your issue of Sept. 9, as some points seem not to have been sufficiently emphasized to prevent a misunderstanding as to the true tendency of the proposed school and the sphere it is to occupy.

In the beginning of your editorial of Sept. 23 on the same subject, you suggest the propriety of letting the proposed school form a special division of existing technical colleges. In the title given my article the institution is spoken of as a college, while the term school, used in its popular sense, would have been more appropriate. Technical colleges and universities all aim too high for the occupations under consideration. Their aim is and should be to produce thinkers and designers, men to guide and teach the masses, minds trained to cope with unknown factors and difficult problems, investigators and promoters in every branch of learning and science. The higher educated classes lead and instruct the middle classes; the latter superintend the work and carry out the infinite number of details connected with it, while the lower class furnishes the common labor. The first class represents the experienced thinkers, the second one the skilled workmen, and the education of the latter as a distinct class would form the most important feature of the proposed institution. By clearly defining the difference between the higher and middle classes of railroad employes, and keeping the education of the two as separate and individual as possible, a step is taken in perfect unison with the true aims of our technical colleges. The European governments, have long ago recognized the necessity for a strict classification of the various professions and callings, and have given prominence in their educational curriculum to the fact that an institution must not endeavor to serve two masters at once or aim to treat heterogeneous elements in one and the same manner. The classical or scientific character of a University should be such as to command general respect for the graduates; while the lower grade Industrial or Trade School should turn out men fitted for better class labor, artisans, foremen and superintendents, who would bear testimony to the practical character of the school. Let us understand under the title of Mechanical Engineer, Civil Engineer, Mining Engineer, Architect, Chemist, Metallurgist, etc., men of the highest standing in their respective professions and standing at the head of large industrial and mechanical interests. On the other hand, let skilled labor be assigned its proper place and receive a corresponding preparatory education. The life and atmosphere of a college, whether classical or technical, is in contradiction to the spirit and the class of scholars to be provided for in the proposed railroad school. While the addition of certain lectures on general railroad subjects in law, transportation or operation matters, is desirable at our technical institutions, so as to give a broader training and wider scope to the professional men turned out, the education of the masses of railroad men who fill subordinate positions of trust can never be accomplished by the existing college system.

These are only a few reasons to substantiate the validity

of the claim that existing technical institutions cannot satisfy the class of education under discussion, and from the latter part of the editorial, referred to above, as also the editorial of Sept. 30, it would appear that you also do not think well of the proposition, as the drift of your opinions turns decidedly towards the railroad shop apprenticeship system with theoretical instruction interspersed between the regular routine work of the shop.

That the latter system has decided advantages and will accomplish much good for certain classes of employes can be readily admitted. The plan, as framed by the Baltimore & Ohio management, if carried out on a large scale, comes very close to furnishing to a certain degree the education desired by the undersigned in the departments it covered. But before accepting this solution absolutely as the best, let us investigate whether "shop" is after all the true and only answer possible to the inquiry for the best education of the large body of trusted subordinates in the transportation service of the country.

The great tendency in this country to try and be eminently "practical" and to accomplish two things with one turn of the hand, while truly praiseworthy as a general principle, is liable to mislead in all matters where the economy resulting from a slower rate of speed cannot be demonstrated till many years have elapsed. Thus to place a boy in a shop or office and then infuse into him at odd periods of the day or week the theoretical part of his more immediate business and a general knowledge of allied branches of railroading, besides usually having to complete his elementary schooling, is very flattering to the go-ahead spirit of our nation. But from the writer's experience with shop life, the men very seldom make use of the wonderful opportunities for observation supposed to be afforded them; the routine work of the shop confines them to one machine for days at a time, and even the entire shop, taken as a whole, only illustrates one particular branch of work. Shop work can only serve in any event for the technical departments of a railroad; it cannot satisfy the requirements of those departments where clerical work and a general knowledge of the broader principles of railroading are essential conditions.

The proposition to have the messenger boys, operators, filing, indexing, checking and recording clerks, car checkers, trainmen, etc., leave their office or the road at certain times of the day to file into a class room, seems very impracticable from a practical railroader's standpoint. Yet this class of men should certainly have an opportunity to receive adequate special instruction for the various duties they are to perform in their practical career. Either a special course of instruction before they enter railroading or else night schools are the only remedies left. The latter fill the gap to a certain extent when no other instruction is available; but it takes young men of exceptional energy and perseverance to accomplish good results. Lessons spread over a long period, with the scholar's attention and strength devoted in the interim to other work, are not conducive to the mastering a subject properly. A continuous, uninterrupted course of study for six months is of more value than an hour or two a day for four years of an apprentice's life.

There are some very grave objections to the establishment of large school annexes to the shops and offices of a railroad company. The permanency of the school or the movement to establish and maintain it in its full working vigor, with the proper division of time between shop and school-room, and the necessary moral aid from headquarters, so as to force all heads of departments and shop superintendents to work in hearty conjunction with the "school-teacher," depends entirely on the strong support and good-will of the highest officials of the road. Let a change of management take place, or the financial condition of the road be impaired, and the school will be one of the first things neglected. That this view is not without foundation is only too aptly illustrated by the collapse, or suspension, as it is termed, of the Baltimore & Ohio Railroad's shop-school. Unless the head management of a railroad is thoroughly determined to maintain the educational movements, the representations from heads of departments and shop foremen regarding the serious obstruction to their business caused by some of the men absenting themselves at certain hours of the day, and the necessity for extra help in consequence, will soon tell and effectually block the permanency and strength of the movement. An institution controlled by politicians affords a very good parallel case to a railroad school wholly dependent on the support of a changing management and the fluctuations of the company's exchequer.

In addition, school-teaching proper is not the business of a railroad and should not be mixed up with its regular routine work to such a degree as proposed in the editorials mentioned. A railroad, however, can well afford under certain circumstances to contribute to the support of an outside school in consideration of actual services rendered or direct advantages afforded them by the school. A railroad company can also establish with signal advantage to itself and its employes, and within the bounds of practicability, special short courses alongside of its regular shop or office work and give limited instructions and demonstrations bearing on the more immediate, actual systems and appliances in use on its own road. These courses might also under circumstances include points that cannot be well covered in the school room. But it would be impossible for a railroad company individually to supply teachers and appliances for the proper instruction in all the branches that should be included in the proposed school so as to be efficient and thorough in its result and to reach railroad men generally.

Even if a number of large roads should follow the example of the Baltimore & Ohio Railroad, the mass of railroad men on the smaller systems would not be provided for, and the large number of boys leaving public schools, willing to avail

themselves of a short, special course of six months or a year prior to entering on their selected calling, would not derive much benefit from schools maintained by a few prosperous railroad companies for the training of their own employes more immediately.

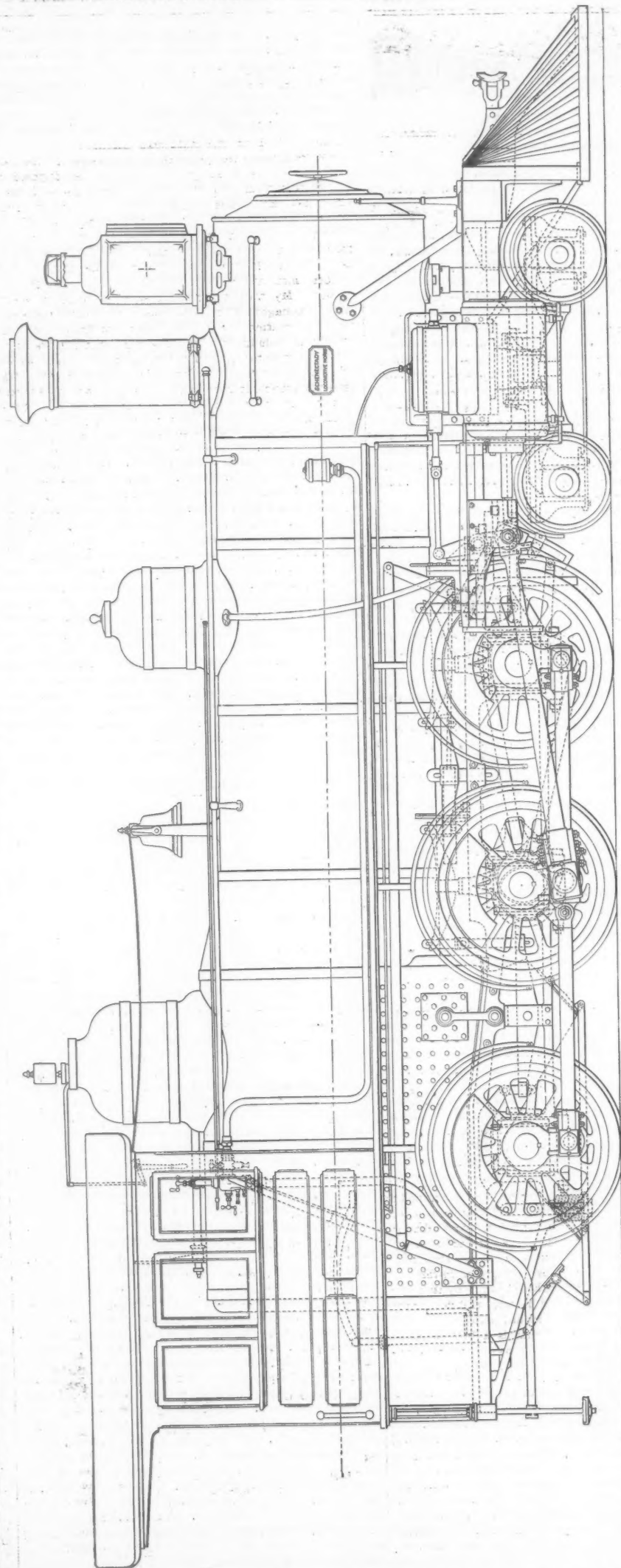
It is not too great a step to suggest that every important city, representing a railroad centre for its state or several neighboring states, could establish a large, well-equipped central school far superior in its general working and influence to dozens of small night courses or shop classes maintained by individual railroad companies with their limited means and the necessary narrow range of studies. That dependence can be placed for the support of the described central school on endowments and material aid from the community at large, when the idea has once taken hold of the minds of the people, is a matter of daily observation. That railroad companies can be expected to contribute under circumstances is practically illustrated by the vote of the directors of the Baltimore & Ohio to contribute annually \$20,000 to any school in Baltimore offering a certain class of instruction to their employes. Unite all the interests and something feasible, permanent and practical will be the result. Multiply these institutions, and have one in all the larger cities and railroad centres and it cannot be denied that much would be accomplished toward reaching large numbers of the railroad men.

Another main objection to schools generally, mentioned in the editorials referred to above, is that practice cannot be taught except in practice. This is one of that class of stereotyped arguments and well-sounding generalities that are brought into play on certain occasions, and allowed to cover a much larger territory than warranted by critical analysis. The misplaced belief in the truth of this sweeping assertion regarding the inability of a school to teach anything bearing directly on practice, has caused thousands of boys, not only in the transportation service, but also in mechanical and industrial pursuits generally, to be consigned yearly to the same fate and to remain in the same net, as others before them, sometimes ascertaining the theory and the broader principles underlying their particular work after years of steady toil, but more generally remaining on the level of mediocre drudgery. Practice, in the sense of becoming skilled or expert in some particular detail of a calling or familiar with a mass of data, statistics and facts appertaining to the immediate work of one department or of a whole system of roads, can naturally only be successfully learned in practice. But the routine life of an apprentice in shop or the elevating duties of a messenger boy or young clerk in an office are not calculated to infuse much enthusiasm in the individual for his calling, and the little bits of general information picked up by the wayside are few and far between. Unless some stimulating influence be kept alive or his interest in his calling awakened and his observing and reasoning faculties trained and developed prior to entering practice, he will labor under the great disadvantage of never being able to grasp the general scope and duties of his calling taken as a whole. He only becomes familiar with its general features by being thrown in constant contact with the subject for many long years. The educated employe on the contrary would enter or return to his calling, after attending the proposed courses of instruction, with a good idea of the subject before him and of the general principles involved together with a knowledge of kindred subjects and familiarity with auxiliary branches. He will not be forced to work in the same channel as others, prescribed by usage and tradition, but will reach correct conclusions by his knowledge of principles and acquaintance with the work and results of others in the same field. In place of understanding only one branch of his calling, like the machinist assigned to one machine, or like the clerk checking off figures from morning to night, he will be better prepared, when the opportunity presents itself, to launch out and demonstrate his ability to attend to more than one detail of his business or to superintend the work of others in the same department. Uneducated inventors have squandered years of valuable time developing and ascertaining one principle or demonstrating to themselves the fallacy of a certain line of reasoning, which the educated mechanic understands and fully realizes at the start. A clerk will labor for months and years over his books, rate-sheets and statistical statements, before entering understandingly into the general principles governing his work, thus becoming more than the mere exponent of an established system.

The space at my command forbids entering fully on this subject and illustrating more thoroughly wherein a short, special course prior to "practice" would be highly desirable and entirely feasible. Any one who will peruse carefully the programme of studies cited in the articles of the undersigned, mentioned above, cannot but be struck with the large number of subjects in each department which either belong properly to the schoolroom, or which can be generally described and the leading principles, appliances or methods explained and illustrated without going directly into shop, office or on the line.

The studies, as outlined in the article mentioned, would be confined to a special course and an advanced course, taking from six months to a year each, according to the department and the aims of the scholar. The means and time required, therefore, to pass through the proposed institution and the low entrance requirements correspond to the grade of scholars to be expected.

The studies in the special course would be conducted in a popular manner, and the subjects treated in a descriptive, explanatory way, illustrated by specimens, charts, plans and models of the materials, tools, methods and appliances in use. Thus this special course would not be too extensive or theoretical, but would serve to give the scholar a general idea of his

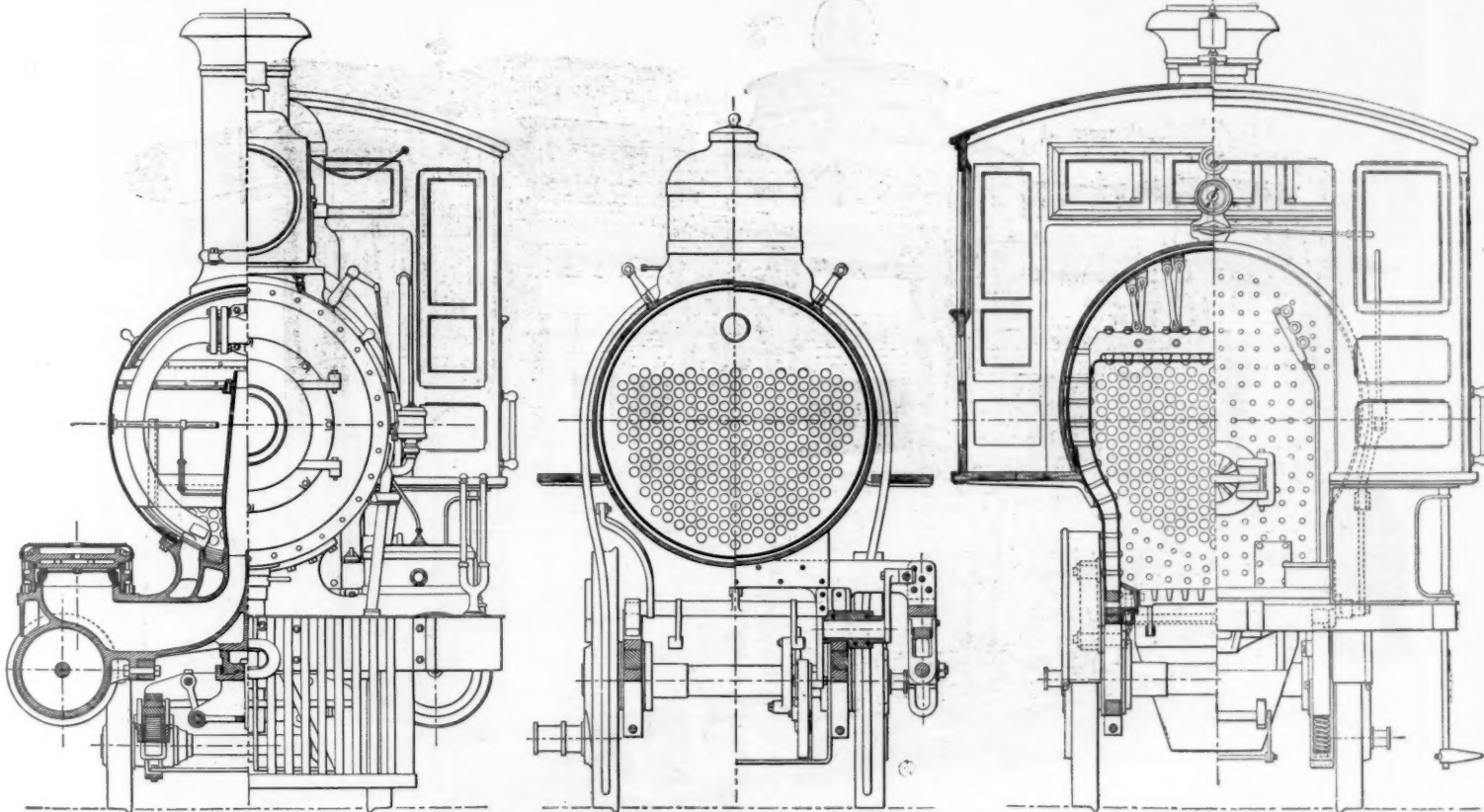


10 FT.
TEN-WHEEL PASSENGER LOCOMOTIVE, COLORADO MIDLAND RAILWAY.
Built by the SCHENECTADY LOCOMOTIVE WORKS, Schenectady, N. Y.

selected calling, and a knowledge of the work of others in the same territory, and would teach him how to observe, compare and reason. The advanced course on the other hand would take up the higher parts and more advanced subjects, and treat them in a thorough and exhaustive man-

ner. This second course would only be followed by scholars whose ability, inclinations and means warranted it.

The institution would form a stepping-stone from public school to practice, while the studies would be conducted so that a practical railroader could leave his work for six



TEN-WHEEL PASSENGER LOCOMOTIVE, COLORADO MIDLAND RAILWAY.

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months or a year and improve his deficient training to good advantage.

I consider that the independent institution, ahead of practice in the case of boys, or supplemental to practice in the case of old railroaders, will afford the best general railroad education to the largest number of railroad men or aspirants to that honor. It will be more efficient, and can be established on a much more permanent and larger scale than shop-annexes or extensive instruction courses maintained by individual railroads, while actual "practice" in shop, office or on the line, supplemented, if found desirable, by special instruction of each road, limited to the particular ways and methods in force on its system, retain their proper place and value in the educational scheme we are aiming to perfect.

While differing with the editor of the *Railroad Gazette* on the relative practicability of schools controlled by individual railroad companies in connection with their shops and offices, developed to the extent he proposes, or special central schools established in large cities and railroad centres, I am glad to see that the necessity and importance of the education of the officers and employees on railroads is fully realized and upheld. While many points can be brought forward, without doubt, in favor of one or the other system, the solution in each case will be influenced probably far more by local circumstances and the financial side of the question.

WALTER G. BERG.

Ten-Wheel Passenger Locomotive, Colorado Midland Railway.

The accompanying engravings represent some fine ten-wheel passenger locomotives recently built for the Colorado Midland Railway, by the Schenectady Locomotive works, Schenectady, N. Y.

The engines are designed for passenger service between Colorado Springs and Leadville, and have to pass over 4 per cent. grades (210 ft. per mile) and through a succession of 16 degree curves (357 ft. radius). The rails are 65 lbs. per yard.

The driving wheel base is therefore short, only 12 ft. 0 in., and as the front pair of drivers have no flanges the effective rigid wheel base is only 6 ft. 6 in. The pressure on the rails per foot forward of the driving wheel base is 8,250 lbs. This is somewhat in excess of the amount usual in heavy consolidation or decapod locomotives, where the weight per foot forward of driving wheel base ranges between 7,000 and 7,500 lbs. The total weight, however, on the drivers of the engine illustrated is nearly equal to that on many consolidation engines, being only about 4,000 lbs. less than the adhesion weight of the Class R on the Pennsylvania. The durability and strength of the permanent way would probably be greatly increased were a heavier rail than 65 lbs. per yard adopted.

In order to surmount the 4 per cent. grades the tractive power is considerable, being nearly 165 lbs. per pound average pressure in cylinders.

Assuming that the maximum average pressure in the cylinders is 85 per cent. of the boiler pressure, the maximum tractive force of the engine would be:

$$\frac{160 \times 85 \times 165}{100} = 22,440 \text{ lbs.}$$

This is almost exactly $\frac{1}{4.4}$ of the weight on the drivers, 99,000 lbs. The resistance due to gravity is equal

to 80 lbs. per ton of 2,000 lbs., and allowing 10 lbs. per ton for friction, the total resistance on the grade would be 90 lbs. per ton. The gross load which the engine is capable of drawing up the grade would therefore be

$$\frac{22,440}{90} = 249.3 \text{ tons.}$$

The weight of the engine and tender in working order is as under:

	Lbs.
Engine.....	121,000
Tender empty.....	31,000
Water in tank.....	32,083
Coal on tender.....	14,900
Total.....	198,983

The weight of train exclusive of engine and tender would, therefore, be:

$$249.3 - 99 = 150.3 \text{ tons.}$$

This amount would be about equal to that of a train composed of two heavy sleeping cars, two first-class passenger coaches, and two baggage or express cars. The engines, therefore, seem capable of handling an average passenger train on such an extreme grade as 4 per cent., which is seldom exceeded on any line worked by ordinary locomotives. This engine is, however, one of the heaviest and most powerful passenger engines ever built, and at the same time appears to possess a sufficiently flexible wheel base to run over curves even sharper than those on the Colorado Midland.

Ample provision has also been made for the descent of the grades, which is often a matter of more difficulty and danger than the ascent, especially when the grades are long and the sudden rain and snow storms prevalent amongst the mountains are apt to convert a dry rail into a very slippery surface without warning. The engines are equipped with Westinghouse brake for tender and train, American steam brake on all drivers and Le Chatelier water brake for cylinders. The driver brake shoes are, however, not shown in our illustrations.

The following are the general dimensions of the engine and tender:

SPECIFICATION of a TEN-WHEEL LOCOMOTIVE built by the SCHENECTADY LOCOMOTIVE WORKS, 1887.

General Dimensions.	
Fuel.....	Bituminous coal.
Gauge of road.....	4 ft. 8½ in.
Weight in working order.....	121,000 lbs.
Total weight on driving wheels.....	99,000 lbs.
Wheel base, total.....	22 ft. 3 in.
" driving.....	12 ft.
" rigid.....	6 ft. 6 in.
Length of main connecting rod from centre to centre of journals.....	8 ft. 8 in.
Transverse distance between centres of cylinders.....	7 ft.
Cylinders and Valves.	
Cylinder.....	19 in. x 26 in.
Horizontal thickness of piston.....	5½ in.
Piston packing.....	Steam packing.
Piston-rod packing.....	U. S. metallic.
" diameter.....	8½ in.
Steam ports.....	16 in. x 1½ in.
Exhaust ports.....	16 in. x 2½ in.
Slide valve.....	Richardson's patent balanced.
" maximum travel.....	5½ in.
" lap.....	Outside, ½ in.
" lead in full stroke.....	Inside, ¼ in.
Valve stem packing.....	U. S. metallic.

Wheels, etc.

Driving wheels outside of tires, diameter.....	57 in.
" axle journals, diameter and length.....	7½ in. x 8½ in.
Truck wheels, diameter.....	28 in.
" axle journals, diameter and length.....	5 in. x 9 in.
Main crank pin journal, diameter and length.....	5½ in. x 5½ in.
Intermediate crank pin journal, diameter and length.....	5½ in. x 4 in.
Front and back crank pin journal, diameter and length.....	3½ in. x 3½ in.
Driving springs, length from centre to centre of hangers.....	34 in.

Boiler.

Working pressure.....	160 lbs.
Style of boiler.....	Wagon top.
Diameter of first ring, outside.....	60 in.
Material and thickness of plates in waist and outside of fire-box.....	Steel ¾ in. thick
Horizontal seams.....	Quadruple riveted with well strip inside.
Circumferential seams.....	Double riveted.
Size of fire-box inside.....	Length, 90½ in.; width, 42½ in.; depth front, 58½ in.; back, 50½ in.
Material and thickness of plates in inside fire-box.....	Steel, crown, ¾ in.; tube, ½ in.; sides, ¾ in.; back, ¾ in.
Water spaces around fire-box.....	Front, 4 in.; sides and back, 3 in.
Crown stayed by crown bars.....	
Size of crown bars, 5 in. x ½ in., welded at ends.....	
Tubes, material.....	Semi steel.
" number.....	234
" outside diameter.....	2½ in.
" length over tube sheets.....	13 ft.
Heating surface, tubes.....	1780.75 sq. ft.
" fire-box.....	133.34 sq. ft.
Total.....	1914.09 sq. ft.
Grate surface.....	28.6 sq. ft.
Grate.....	Rocking (finger bars) with drop plate.
Asb pan.....	Hopper, with dump plates worked from cab.
Exhaust nozzle.....	Single.
" dia.....	5 in.
Throttle.....	Balanced valve in dome.
Stack, inside diam.....	18 in.
" top above rail.....	14 ft. 9½ in.
Boiler supplied by two injectors placed right and left.....	

Tender.

Weight, empty.....	31,000 lbs.
Number wheels.....	Eight.
Tender axle journals, diameter and length.....	4 in. x 7 in.
Wheel base, total.....	15 ft. 6½ in.
" truck.....	4 ft. 4 in.
Frame.....	Angle iron.
Trucks: Schenectady Locomotive Works Patent 4-wheeled channel iron bolster. Centre bearing front and back, with additional side bearings on back truck.	
Water capacity.....	3,850 gallons.
Coal capacity.....	7 tons.
Engine and Tender.	
Total wheel base, engine and tender.....	48 ft. 8 in.
Total length of engine and tender over all.....	57 ft. 5½ in.

Annual Track Inspection of the Savannah, Florida & Western.

The report of the fourth annual inspection of this road and of the Charleston & Savannah, which is under the same management, has just been issued. The tables prepared by this company are printed in elaborate shape, the detailed markings for the six different points on which premiums depend are printed in full, in clear, large type on heavy paper, and the averages and totals are shown in an admirable manner,



STREET CAR FOR THE EMPEROR OF BRAZIL.

Built by the GILBERT CAR WORKS, Troy, N. Y.

The general rules under which the inspections on this road are made were published in the *Railroad Gazette* of Aug. 20, 1886, p. 571. Slight alterations have been made since then, and the whole code is printed in full in the report. At the end of the report is a table showing the relative standing of the sections on each division, and of the divisions as compared with each other. This is shown under each of the six heads—line, surface, frogs and switches, etc.

The division premiums for the year were as follows: G. M. Archer, supervisor, 1st premium, \$100; J. F. Lamb, foreman, 2d premium, \$50. The section foremen who took first premiums (\$40) were as follows: J. E. Reardon, J. M. Wilson, J. W. McRae, H. B. Sutton, E. Humphrey, J. S. Moore. The section foremen who took the second premiums (\$20) were as follows: M. C. Williamson, B. C. Aiken, J. O. Ward, A. Gill, J. M. Thomas, E. D. Williams, W. W. Silas. W. J. Blitchington would have taken first premium but received none because he had been in charge of his section less than six months and was thus ruled out.

The Committee on Policing made a special report on section houses and grounds, for which a special premium of \$10 is given to the wife of the section master having the best marking on his division. The names of the successful ones follow: Mrs. L. W. Williams, Mrs. J. E. Reardon, Mrs. W. H. Thomas, T. Dunbar (not married), Mrs. M. B. Raiford, Mrs. E. Humphrey, Mrs. J. H. Dawson.

We subjoin the summary of averages showing the condition of the roads as a whole for the four years that this system has been in use. It will be understood that the markings are on a scale in which ten represents perfection.

TOTAL AVERAGES OF ANNUAL INSPECTIONS.

Charleston & Savannah Railway.							Total average per mile.	
Year.	Line.	Sur- face.	Level.	Frogs and switches.	Drain- age.	Policing.		
1884	Not given.						7.740	
1885							7.850	
1886							7.510	
1887	8.14	8.03	8.14	7.18	8.30	5.06	7.610	
Savannah, Florida & Western Railway.								Total average per mile.
Year.	Line.	Sur- face.	Level.	Frogs and switches.	Drain- age.	Policing.		
1884	8.03	8.02	6.72	8.99	7.70	7.68	7.950	
1885	8.43	6.88	7.10	8.62	6.31	8.10	7.601	
1886	8.46	2.47	7.43	7.87	8.17	7.60	8.083	
1887	8.21	7.68	8.04	8.17	8.14	7.58	7.956	

It will be remembered that Superintendent Fleming, in speaking at the Superintendents' Convention in New York City, expressed a willingness to send copies of this report to any railroad man interested.

Imperial Street Car for Brazil.

The accompanying engravings represent an imperial car which the Gilbert Car Manufacturing Co., of Troy, N. Y., have recently shipped to Rio de Janeiro for the use of the Emperor of Brazil and his family. The car is most luxuriously fitted up, as will be seen from the following description:

The body is mahogany, both inside and out, most elaborately paneled and decorated; the dome of the most expen-

sive jeweled glass, surmounted by the Imperial Crown in gold. The windows and mirrors are of French plate glass. The chandelier, water-cooler, the locks and other metal work inside the car, as well as the upper part of the exterior work, are all gold-plated in the parts where brass is usually employed. The carpeting and drapery is of the most expensive quality. The curtains are of brocatelle, inlaid with cloth of gold, and the shades of the richest silk plush. It is arranged for lighting by electricity, and also has electric bells.

The car is to be run on the Botanical Garden Railroad, which is the first street railroad built, and one of the largest in South America. It is said to be one of the best managed street roads in the world.

The New York Railroad Club.

The regular meeting of the New York Railroad Club was held at the rooms, 118 Liberty street, on the 17th inst. The President, Mr. C. E. Garey, was in the chair and there was a considerable attendance of gentlemen interested in railroad supplies. The subject for the evening was "Car heating, lighting and ventilating."

Mr. STRUCK exhibited a model of a stove with a safety coupling. The following is a verbatim quotation from the inventor's circular describing his device:

"MERIT.

"For Strong Construction, Fresh and Heated Air Circulated, Protection from Contact, its control and extinguishing of fuel at unnatural position of cars."

"Colliding, Plunging or Rolling, Quick Economical Heating at every point for Rail Roads, a Sure Relief when accident disables Engines or Cars detached, ready comfort from cold and stormy weather, a boon companion to pipe heating system, to make car ready, to create a store heat and immediately extinguishing on wrecking both systems. Something left in cars. Remaining intact to shelter the survivors. Freight and Caboose Cars made comfortable and safe from fire and destruction. Traveling public made safe. Companies property protected. No hot pipes and steam pressures. No hot oppressive foul air. No cast iron covered up vessel to smash in a hot iron pile. No out-door work for train hands. No cut offs and cut unders required. All class of cars mingled in train."

Mr. E. Y. BELL, who at the last meeting of the club was an advocate of the stove and pronounced the law prohibiting stoves to be unconstitutional, now spoke as an advocate of the Gold system and strongly denounced stoves and all their works.

Mr. STRUCK stated that the public were unable to judge of the safety and merits of the different devices used by railroads, and claimed that his system was cheap and safe.

Mr. EDWARD GOLD, in reply to questions from Mr. R. C. Blackall and others, explained that his coupling was not yet used on the New York elevated. The first necessity in heating cars there was to devise some reservoir of heat, and that he had accomplished. The Hickman coupler was at present in use, but would probably be superseded by the Gold coupler. At present there was some trouble from frozen couplers, when a train was left standing for any length of time. The

Gold coupler was provided with a trap which would let off the condensed water as the temperature fell, and, therefore, would effectually guard against any trouble from frost. These traps are tested at a pressure of 150 lbs. and, when properly made, give no trouble. They were composed of a thin brass shell, partially filled with alcohol. The alcohol vaporized when heated by the steam and the pressure of the vapor bulged the ends of the shell out and closed the orifice to the atmosphere. When the temperature fell the shell collapsed and permitted the escape of the condensed water. The fit of the shell could be regulated by set screws.

His system of storing heat, by means of a large closed pipe full of salt water, would keep a car warm for five hours. As a circulation was established ten minutes after steam was admitted to a car, passengers would not complain if the car was not heated until the engine was attached, for with continuous steam heating a car was soon made comfortable. Under ordinary circumstances there appeared to be no need of any method of supplementary heating, but if a car had to stand over at some point for more than five hours, or if there was some risk of being stalled in deep snow, a common stove could be placed in the car, to be used when required.

Mr. SEWALL had not found that traps were necessary and did not believe thermostatic traps would work. It was not a question of pressure but of temperature, and his belief was that after a few years' service the traps would be found to work very badly. In his system the condensed water had never given any trouble, though they had run for two years in Maine where the thermometer was occasionally 40 degrees below zero. Ice formed in the couplings, but never closes them up or burst them, a clear passage being always found. In his system the condensed water did not run towards the couplings, but towards a small boiler under the car, and there it formed a reserve ready to be heated by gas or other fuel when the car was detached from the engine or for any reason the continuous principle of heating could not be used. He made a gas by chemical action underneath the car. The coupling was the result of some years of study, and a cardinal principle with him has been that the surfaces making the steam-tight joint must have no rubbing motion on one another. This was accomplished in the coupling where the surfaces were merely butted together.

The two couplings would pull apart automatically when the train separated. His system had been used on trains of from 10 to 15 coaches. The heat could easily be regulated on each coach independently. The coupler could not be separated by any motion of the car on any road however rough. Nothing but an actual separation of the train would effect a separation of the couplings. He believed it was necessary that cars should have a reserve of heat. At some points in Maine cars were left standing for 24 hours with the thermometer 20 to 30 degrees below zero.

The power of controlling the temperature was very valuable, and would enable the car to be kept at a comfortable temperature in any climate and in any part of the season. The objection to having a common stove in a car was that after use it was difficult to insure the fire being completely extinguished. While it was safe to have a fire in a stove as



STREET CAR FOR THE EMPEROR OF BRAZIL.

Built by the GILBERT CAR WORKS, Troy, N. Y.

long as the car was standing, it became a source of danger when the train was in motion. The stove also occupies space which could be utilized to seat passengers, and his arrangement of a boiler underneath the car obviated any loss of valuable space. Any system like Mr. Gold's, which stored heat under pressure in large pipes, would be dangerous in accidents. The Sewall system used low pressure, and there were no bends of the pipes underneath the seats. Practically there was no difficulty in getting at this boiler underneath the car in deep snow. In 1861 and 1862, on a road with which he was connected, the average depth of snow for 100 miles was 13 ft. This would show the weather through which this system of heating had passed; but, nevertheless, it had been perfectly successful. The condensed water passing into the boiler could not drip on the planking at stations and form ice, which was annoying and dangerous to passengers. Any reservoir of water, such as used by Mr. Gold, would freeze if left long enough, and therefore must be emptied if the car was to be left standing for any length of time.

Mr. GOLD: We have had no trouble from freezing and do not let the water out.

Mr. SEWALL: You will find that you will have to do it when the weather is as cold as we have it in Maine.

Mr. BELL: What prevents the water in Mr. Sewall's boiler from freezing?

Mr. SEWALL: Its temperature. (Laughter.)

Mr. BELL thought the Sewall system was objectionable, as he had a perfect boiler shop underneath the car, and that it was as dangerous as the Struck system, without Mr. Struck. (Laughter.) While he did not expect perfection, he protested against any stove being placed in the car. A friend of the speaker had recently informed him that Mr. Pullman wanted a heater where his men could see it, and that he did not believe in underground boiler shops or hot storage in sub-cells beneath his cars. (Laughter.) Mr. Sewall appeared to depend upon gas to heat his car when the locomotive was detached, but what would he do when gas was generally superseded by electricity?

Mr. SEWALL replied that the gas used by him differed from that used by Mr. Bell. (Laughter.)

The discussion then closed, and Mr. Fennerty, of Washington, D. C., brought forward a model of a system of operating deck lights. The President pointed out that it would be rendered inoperative by a fall of sleet.

The following subjects were announced for the next three meetings:

December: The Master Car-Builders' Association Rules of Interchange and Repairs by Contract.

January: Car Wheels and Axles.

February: Automatic Draw-Bars for Freight Cars.

The meeting then adjourned.

Uniform Freight Settlements.

It will be remembered that the auditors of a number of prominent Western roads lately united in issuing a call for a meeting, to be held in Chicago Dec. 7, for the purpose of discussing the feasibility of getting at some uniform method of settling the accounts between different roads of the revenue on freight which is waybilled through over two or more roads. The call for the meeting alluded to the great diversity of methods now in use and to the desirability of abolishing some of the confusing elements. In order to get at the present state of affairs we have made inquiries of the accounting officers of a few prominent roads in various parts of the country concerning their ways of providing for this part of their business, and here give the substance of their responses.

In the first place, much freight is, and doubtless always will be, billed separately over each road. A shipment, for instance, from a station on the New York Central for Erie, Pa., is waybilled to Buffalo, the agent there makes out a bill for the charges thus far accrued and presents it, with the goods, to the Lake Shore, whose agent pays him the amount of the bill; this amount is then entered as advanced charges on the waybill from Buffalo to Erie. Where a regular business of this kind is done the agent of the delivering road charges the amount of such bills in a book, but collects the money therefor only once a month, week or day, as may be agreed upon. Of course there will also be freight moving in the opposite direction, and the other agent will at the settling time have a counter account to offset the first-mentioned; the difference between the totals of these accounts represents the balance due to one road or the other for the month, week or day since the previous settlement. This may be termed the primitive method.

But as traffic grew it became necessary to bill through in order to save clerical labor and time at points of transfer. A hundred entries from Albany for Chicago, if rebilled at Buffalo, necessitated much clerical labor and care for which no return was realized. The agent at the original point, therefore, makes out a waybill direct to Chicago in which the amount of freight charges covers the sum to be collected for both roads. It is the manner of accounting for this business that is to be considered at the meeting.

The methods in use are two; there is, as was stated in the circular convening the meeting, great diversity, but it is chiefly in minor details: the systems in use are simple. One plan is to have each way bill show upon its face the proportion of the total earnings that is to go to each road, so that the agent at the junction point can enter the amounts in his books and then settle with the agent of the other road just the same as though the goods had been billed to the junction station only. The usual name applied to this plan is "junction

settlements." The other plan is to have the proportion accruing to each road omitted from the way bill, leaving the junction agent to hand the goods (with way bill) over to the next road precisely the same as he would if there were no charges on them whatever. The financial part of the transaction is then settled by the head accounting officers of the respective roads at the end of the month or later. This is termed an "Auditor's settlement." An incidental advantage of this system, which has been spoken of by some, is the freedom from impertinent inquiries which prying consignees sometimes make if they happen to see a way bill on which appear some divisions that are in their opinion unjust, or indicative of extortion on the part of one road or the other.

The advent of through freight lines which led to the making of way bills over long routes, traversing from three to a dozen or more different roads, led to a partial abandonment of auditors' settlements (where they were used) for the reason that the long time a shipment might be on the road would cause much confusion in the dates, a monthly dividing line being impracticable; moreover, so many parties interested in one bill would be an intolerably long time in coming to an agreement. "Line freight" is therefore generally dealt with under the junction settlement plan. The Pennsylvania road, however, settles its line business wholly in the general office; but it probably confines its through billing largely to roads which it controls.

As to the present practice of the roads of the country, it is to be observed, first, that business not billed through, but transferred on vouchers, is not treated uniformly. Some roads have the local agent settle by cash payment if he can, but have him make a draft on headquarters if he has not sufficient funds in hand; others have him make a draft regularly (when the balance is in favor of the other road), and hand it over to the other agent as cash; still others have the agents simply agree on a balance and send it to headquarters, all the checks and drafts passing direct from the treasurer of one road to the treasurer of the other. One auditor adopts the latter plan because he finds that cash settlements between agents offer an excuse for accumulating money beyond the authorized limit; his agents send weekly advices by telegraph in order to facilitate these settlements.

The roads in the South seem to use junction settlements for through billing more than in any other section, though they—or at least two prominent roads—say they have exceptions, using the auditors' settlements with some of their neighbors. Prominent roads in the Middle states favor the junction settlement, but use both. The New England roads use auditors' settlements, and most of the business in the region west of Chicago seems to be done in that way; but they all seem to make an exception in the case of line freight for the reasons above noted. In fact, line freight is very generally rebilled, either in full or in skeleton form, so that for account-

ants' purposes it may almost be said to be taken out of the billed-through class, except on the Pennsylvania.

The time of payment varies greatly, though weekly settlements are very generally favored. There is little geographical distinction on this point. Of those who make monthly auditors' settlements several have partial approximate payments during the month (generally once a week) so that the balance when finally figured out shall not be large; and those who use junction settlements and as a rule settle weekly make an exception where balances are very large, having them squared up daily.

The time occupied in writing up and footing up the accounts is one of the chief objections to auditors' settlements; not a road mentions less than ten days as occupied in this work, and some say that 5 to 10 weeks are needed; the general testimony is that two to four weeks are required under present conditions. An auditor of one prominent road, who favors junction settlements, makes an exception in the case of "straight car-load traffic, like coal, which can be handled conveniently by auditors' settlements."

Much of the delay comes from the uncertain and irregular methods of rectifying errors. The simple way is to settle "on the face of the returns," and leave any mistakes afterwards discovered to be allowed for in the next month's account; all those who in their replies to our inquiry expressed themselves on this point were in favor of this method except one, who says he is decidedly in favor of settling by "corrected figures." It is plain, however, that some accountants do not like it, especially if it is the other road's figures that are to be accepted as *prima facie* correct. This will be seen in the following account which one northwestern accountant sends us of the diverse practices that have to be submitted to by his road.

One road waybills through, but requires settlement to be made between the agents at the junction.

Another requires the return of original waybills received by us.

Others exchange abstracts of both forwarded and received business.

Others require us to send them received abstracts only.

To others we send abstracts of our forwarded business which they check and return.

Others ask us to check and return their forwarded abstracts.

All but the first mentioned make statements of accounts including business in both directions in one account.

Some (those that have balances uniformly due them) accept our statement as the basis of cash settlement.

Others (those whose balances are uniformly due us) require us to accept their statement as basis of cash settlement.

The present methods in use between us and our connections make it always a matter for dispute, whether we shall hold the accounts open an indefinite length of time in order to get all differences adjusted before settling, or accept either their or our statement as rendered as a basis of cash settlement, subject to correction in a subsequent month's account. If the latter is done, there is further dispute as to whose statement shall be taken as the basis, and the decision is generally in favor of the road that owes the money, on the "take this or nothing" principle.

A prominent Southern road gives the following clear statement of its practice:

On freight billed through, the through bill has extended thereon each line's proportion. Our agent at the junction point abstracts these through bills to connections each day, and turns over the bills with the abstract, after recording the totals. At the close of the week a summary of the daily abstracts is made, and the balance of account due is agreed upon by the respective agents. Both agents certify to the correctness of the balance, on two certificates, which are forwarded one to each Comptroller. The agent that owes the balance draws a draft for the amount due upon the treasurer of his company, and turns it over to the other agent, who remits the draft as cash. The draft is collected through bank, but, before being paid, is referred to the Comptroller to check against the certificate bearing the signatures of the two agents.

We give below two specimen opinions, the first being from a road in the West and the second from one in the South. The latter, though mild in tone, touches upon the point that is generally deemed vital, to wit, the getting of the money into the treasury quickly. The large roads which favor junction settlements seem to depend upon this as their principal argument.

The Western man says:

"Let each road send to its connection an account for all way bills it receives, showing detailed statement of way bills, apportionment and amount due on the business reported. Let this report be accepted by the forwarding road, arbitrarily regardless of errors as the basis of cash settlement. Settlement to be made by draft or voucher, either for total of report or balance between the two reports in precisely the same manner as settlements for coupon ticket sales are now made. Any errors or omissions in these reports to be adjusted in a subsequent report, similar to the manner that errors in ticket reports are adjusted. For business passing over three or more lines let it be a matter for agreement between the lines interested whether the receiving road shall report to all lines interested and settle with them direct or report only to its immediate connection and let it report in turn to the next connection. My preference would be for the former method (settle direct with each)."

The Southerner says:

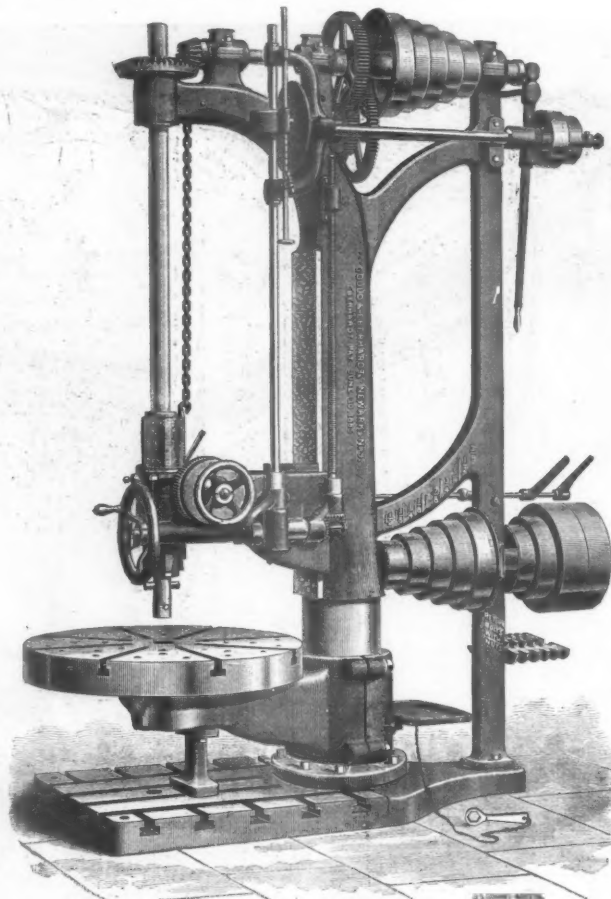
"Through billing where divisions are shown on way bills and settlements made by junction agents facilitates work in the accounting department. The month's business can be closed earlier, and cash is covered into treasury quicker.

"Through billing, when settlements are made through accounting department, it is claimed facilitates the movement of freights and relieves junction points of labor and expense. Either system can be handled very well.

"Through billing, when settlements are made through accounting department, should be confined to the larger points. Shipments to smaller intermediate stations should be rebilled at junctions."

Improved Drill Press.

This press has been improved since last illustrated by the addition of an automatic feed to the sliding head, by means of which, in addition to the spindle it can be fed either up or down through its entire range of vertical movement. This feature will be much appreciated and for many kinds of bor-



IMPROVED DRILL PRESS.

Made by MESSRS. E. GOULD & EBERHARDT, Newark, N. J.

ing will undoubtedly be of great advantage. On the large size the head is raised or lowered in a few seconds by power (means not shown in cut), the entire length of vertical movement on column independent of the automatic feed for drilling purposes. All feeds are variable instantly from zero to the full capacity of about $\frac{1}{8}$ in. to one revolution of the drill spindle and any intermediate feed may be obtained.

The method by which the back gear is thrown in or out of action by a single movement of a lever is convenient. The cone pulley runs loose upon the shaft, and at its back end is a clutch, one part of which is fixed to the cone and the other is extended to form a sleeve which extends through the box, and is engaged or disengaged by the movement of the lever. This sleeve drives the shaft by means of a feather. The other shaft, upon which the back gears are keyed, slides in its bearings so as to connect its gears with the others, a movement which is effected by the same motion of the lever which connects or disconnects the clutch.

A shelf is provided upon which to keep wrenches, tools, etc., and there is also a rack in which to hang bolts so that they may be found when wanted, instead of kicking about on the floor.

Any further information may be obtained of the makers, Messrs. Gould & Eberhardt, Newark, N. J.

South African Railroads.

The greater part of South Africa is divided politically between the English colonies and the Boer republics. Portugal owns an indefinite area on the east coast near

are unknown, except on the tops of the highest mountains, and though the sun is powerful, the nights are invariably cool. The rainfall in the northwestern portion is very small, and occurs only in the winter in the southwestern portion, and in the summer in the eastern province. The rainfall on the elevated plateau of the Transvaal is copious and thunderstorms are frequent.

Indigenous timber and lime are very scarce, and teak, an expensive but very durable hard wood imported from India, is almost the only foreign timber unaffected by the climate.

It is difficult to obtain sweet water from wells, and as the rivers, though subject to tremendous floods, are dry most of the year, a want of water is the great drawback to the prosperity of the colony. Excellent crops can, however, be grown where irrigation is possible, but much of the colony must ever remain a desert, the vegetation being very sparse.

Sugar is grown in Natal, but the principal products of South Africa are wool, mohair, copper and ostrich feathers. The diamond mines at Kimberley have been, however, for many years the most valuable source of wealth. Gold has been discovered over a great portion of the Transvaal, in Swaziland, in Matebeleland, and in Namaqualand. The principal gold fields are near Barberton and Johannesburg, which in a short time have become the largest towns in the Transvaal.

The following table, which has been compiled from the latest available sources, will give some idea of the population, size and trade of South Africa. The states under native rule, Basutoland, Zululand, etc., are omitted.

		Area. Sq. mls.	Population.		Revenue.	Imports.	Exports.	Railroads. Miles open.
			White.	Colored.				
Cape Colony (including Transkei and Griqualand West).....	British Colonies.....	213,636	340,000	900,000	\$17,500,000	\$26,250,000	\$34,730,000	1,764
Natal.....	.....	19,000	35,500	389,000	3,300,000	7,590,000	4,000,000	306
Orange Free State.....	.....	41,484	72,500	61,000	850,000	9,300,000	10,170,000	.....
Transvaal.....	Dutch Republics.....	112,700	55,000	750,000	1,100,000	2,600,000	3,000,000	70
Zulu Republic.....	.....	1,800	?	?	.....	.....	.....	.....
Mozambique.....	Portuguese.....	80,000	?	500	500,000	.....	.....	.....
Angra Pequena.....	German.....	?	?	?	.....	.....	.....	.....

Delagoa Bay, and Germany holds the west coast from the mouth of Orange River, north to 16 degrees south latitude, Angra Pequena, the assumption of which in 1884 caused some excitement, being the headquarters of the German occupation.

Physically, the country has been compared to half a broken saucer, with the edge up, that is on the east. South and southwest there are mountains encircling the basin of the Orange River, which mountains are nearer the sea at the south than on the east, where they are, in Natal, some two hundred miles from the coast. The interior or Northern Karroo is elevated nearly 4,000 ft. above the sea.

The Mozambique current which follows the southeast coast gives a copious rainfall in Natal, which has a semi-tropical climate, differing considerably from that of the balance of South Africa.

The climate is very dry, clear and healthy, frost and snow

The first railroad in South Africa, the commencement of the line from Cape Town to Kimberly, was opened in 1859, with a guarantee of interest from the government, but that and other roads were taken over by the government, and 1,599 miles of 3 ft. 6 in. gauge had been constructed up to the end of 1885, with a capital account of £13,407,385.

There are, as will be noticed on the accompanying map, three systems of roads in the Cape Colony, viz:

	Miles.
The Western System.	
Cape Town to Kimberly.....	648
Branches.....	70
The Midland System.....	718
Port Elizabeth to Graaff Reinet and Colesburg, with branches.....	589
The Eastern System.	
East London to Aliwal North and branch.....	292
Total.....	1,599



The Midland system connects with the Western. The Eastern is isolated. The Western system crosses several ranges, and has many bridges and some tunnels, reaching a maximum attitude of 4,572 ft. All systems are characterized by sharp curves and long $2\frac{1}{2}$ per cent. grades. In the later lines the maximum grade has been fixed at 66 ft. per mile. The Eastern system attains an elevation of 5,446 ft.

The following table will show the maximum grades and curves:

	2½ per cent grades: percentage of system.	Miles of curves of the following radius in feet.
Western system.....	4.06	0.937
Midland system.....	9.30	1.937
Eastern system.....	17.11	9.312

The first rails laid were 40 lbs. to the yard, then 45-lb. rails were laid and lately 60-lb. rails. The ties are mostly imported Baltic fir, 7 ft. long and 10 by 5 in. Some iron and steel ties are also being introduced. Most of the through trains are mixed passenger and freight, and run at about 14 miles per hour including stops. A daily mail train is, however, run through at a higher speed, and a special weekly mail train in connection with the steamer to England is provided with dining car, etc. All cars have provision for sleeping. Numerous suburban passenger trains are run near Cape Town and Port Elizabeth. The main line freight engines are 10-wheelers, with 15×20 in. cylinders and 42 in. drivers. All trains, freight and passenger, are fitted with a tell-tale non-automatic continuous vacuum brake.

In 1880 there were but 961 miles; the number of passengers carried was 1,324,406, and 308,636 tons of freight, and in 1885 2,428,586 passengers and 375,103 tons of freight were transported. The three systems have 227 locomotives, including two "Fairlies," 330 passenger and 3,581 freight cars.

In addition to the government lines, there are three private lines completed, viz.:

Port Nolloth south of Orange River, to Ookiepo..... 92 miles.
Grahamstown to Port Alfred..... 43 "
Worcester to Roodevaal..... 40 "

to the last of which the government contributed subsidies of £50,000 and £75,000 respectively.

The Cape railroads yield a profit of about $3\frac{1}{2}$ per cent. on their cost, and with the natural growth of traffic will probably become a considerable source of profit to the government.

The Natal railroads run from Port Natal through Pietermaritzburg to Ladysmith, 196 miles, the extension of which to Newcastle, some 60 miles further, is completed or near completion. In addition to which there are some 40 or 50 miles of branch lines, and the colonial government propose to extend the main stem to some point in the Transvaal.

Lastly, there is the Delagoa Bay or Lourenço Marques line which was commenced about two years ago under a charter from the King of Portugal, and is intended to be built to Pretoria in the Transvaal. About 70 miles of this road are now completed and supplies for the Boers and gold diggers are passing over it.

South Africa has been but two natural harbors, Saldanha Bay and Delagoa Bay. The former is unused and the latter is

very unhealthy. As, however, it is the nearest port to the Transvaal, the Boers have made several efforts to get a railroad, especially as the dreaded tsetse fly renders ox wagon transport impossible. The wants of the gold miners promised to supply paying traffic, and the line has now been built by an English contractor for a Dutch company with a capital of \$3,360,000.

The Cape government have now proposed to extend their lines through the Orange Free State and the Transvaal, passing through the principal gold fields. The route is shown in dotted lines in the accompanying map. The estimated length is 485 miles and the estimated cost \$14,000,000. The Orange Free State government have assented to this proposal, and it is probable that the Transvaal authorities will also consent, as the cheaper means of transport will much facilitate trade and aid in developing the gold mines. The latter are principally in quartz lodes, and considerable shipments of crushers and mining machinery have been exported from this country.

The Westinghouse Train.

Another of the series of trials of the Westinghouse freight brake took place at Ridgefield Park, on the West Shore road, near Weehawken, on the 21st inst. The usual tests were made, with very satisfactory results. The novel performance of running a train of 20 freight cars fitted with the freight brake, but with increased leverage, against an ordinary passenger train, proved especially interesting. The passenger train was composed of ten West Shore passenger cars, which, as our readers are generally aware, are all of the most modern description, and built in the best possible style. Notwithstanding this fact, at a speed of 45 miles an hour, the improved brake stopped the train of 20 cars in 495 ft., while the passenger train with the ordinary brake ran 709 ft. further. It is hardly necessary to point out the great importance of this difference, which would in many cases of emergency mean all the difference between perfect safety and a frightful disaster. As on previous test of this description, the trains ran on parallel tracks at the same speed, the engines keeping abreast of one another. At a given signal the brakes were applied simultaneously on both trains, with the result that the passenger train shot ahead with its whole length clear of the freight train. A more forcible proof of the great improvement that Mr. Westinghouse has effected in the operation of his brake could hardly be given.

The results obtained were as follows:

TRAINS OF 50 EMPTY FREIGHT CARS, 60,000 LBS. CAPACITY.			
	Speed. Miles per hour.	Distance. Ft.	Time. Secs.
1. Emergency stop.....	23	203	12½
2. Emergency stop.....	41	674	20
4. Emergency stop.....	41	672½	20
6. Hand-brake stop.....	21	2,137	85
7. Break-away test. The portions of train when stopped were 43 ft. apart.			

The following tests were made with a train of 20 empty freight cars of 60,000 lbs. capacity fitted with the freight brake, but with increased leverage for passenger service.

8. Emergency stop.....	22	91	0
9. Omitted.....			

The following test was made with the above train and a train of West Shore passenger cars run side by side, the brake being applied simultaneously to both trains when the engines were abreast and running at the same speed:

10½ Freight.....	45	495	13½
1 Passenger.....	45	1,504	27

Among those present at the test were: Messrs. J. D. Layng, General Manager; C. W. Bradley, Superintendent; Theodore Houston, late Receiver, and W. G. Watson, West Shore; Joseph Crawford, Superintendent N. Y. Div., Pennsylvania; S. M. Felton, Jr., First Vice-President; R. H. Soule, General Manager, New York, Lake Erie & Western; H. J. Hayden, Second Vice-President; Walter Katte, Engineer; Theodore Voorhees, Asst. Gen. Supt.; C. M. Bissell, Div. Supt., and J. H. Franklin, New York Central.

The trials with the Westinghouse train will be repeated on the 26th inst. at Winewood, situated on the Pennsylvania, near Philadelphia. The train will then proceed to Washington, where some further trials will be given, and thence to Pittsburgh, where the series of trials will be concluded.

North Chicago Rolling Mill.

Statement of material manufactured and consumed for the three months ended Oct. 31, 1887:

Manufactured product.	Aug. Tons.	Sept. Tons.	Oct. Tons.	Total. Tons.
Pig iron.....	34,970	33,796	36,417	105,113
Steel ingots.....	35,360	34,221	35,270	104,853
Steel rails.....	30,170	28,902	29,771	88,843
Spiders.....	11,863	10,913	11,671	34,447
Merchant bar.....	2,765	2,674	2,653	8,093
Nails.....				1,170
Total manufactured product.....	100,530	96,849	101,460	314,347
Raw materials used.....	Tons.	Tons.	Tons.	Tons.
Iron ore.....	55,608	52,578	56,445	164,631
Coke.....	39,851	37,479	40,040	117,370
Cr. l.....	20,653	21,385	21,077	63,115
Limestone.....	11,863	10,913	11,671	34,447
Spiegel.....	2,765	2,674	2,653	8,093
Total raw materials used.....	130,741	125,029	131,882	387,656
Total manufactured product.....	100,530	96,849	101,460	314,347
Total material manipulated.....	231,271	221,878	233,346	702,003

The New Chicago Water Tunnel.

The following bids were received for the new water tunnel at Chicago:

A. Onderdonk, New York.....	\$748,500
M. P. Garrity.....	800,628
E. Earnshaw.....	823,161
Fitz Simons & Connell.....	887,490
McAdams & Amberg.....	1,007,160
Angus & Robinson.....	1,145,175

The lowest bidder will probably receive the contract. Mr. Onderdonk created considerable surprise by underbidding several well-known Chicago contractors, but as he has successfully built over 40 tunnels on a section of the Canadian Pacific, and many harbor improvements in San Francisco, he is probably well posted as to the actual cost of tunneling. Messrs. Angus & Robinson, the highest bidders, built the Hyde Park Water-works tunnel, 5,000 ft. long, and Messrs. Fitz Simons & Connell were the contractors for the Lincoln Park shore protection and many similar works in Chicago.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

A member of the Roadmasters' Association Committee on Standard Frogs excepts, in a letter in another column, to the *Railroad Gazette's* warm approval of the Association's action in not approving of rigid frogs in main track.

The position we assumed as to the relative merits of spring and rigid frogs was quite in accordance with the best modern practice. The reasons which led the committee to report in favor of the rigid frog seem from the above communication to be the danger of "hollow" or "grooved" tires forcing the spring rail out of place, by straddling the point before the wheel tread has begun to bear on the wing rail, and the disadvantage of having a supporting bed of varying elasticity. For such roads as neglect to keep their tires in proper repair, the spring frog is made with the movable wing longer than the rigid one and lying against the point for a much greater distance than in the earlier forms. The outer edge of a hollow tire is thus given a bearing long before the groove can dip over the point as described above. The second objection is met by having the whole frog made without having any supporting plate; that is, as an ordinary keyed frog. Both of these forms are fully described in Parsons' "Track," page 53. On the other hand, the objections to the rigid frog are so strong that it should never be seen in the main track of a line with any pretensions to economical management or to having any regard for its passengers' comfort. The jar that results from the dropping of every wheel on to the worn wing is, with the exception of that caused by a stub switch, the most severe shock sustained by the machinery and running gear. The further economy as respects difference in life of the two styles of frogs is greater, we think, than allowed by the committee. On our Northern trunk lines, where the track is held in a frozen roadbed during two to five months every year, rigid frogs will frequently wear out in six months, whereas a spring rail frog under similar conditions has an average life of four-fifths that of the contiguous rails. This general statement is capable of ample verification.

The locomotive which we illustrate in the present issue is a remarkable example of the increase in weight that has taken place in passenger locomotives. Ten years ago, few passenger engines weighed 100,000 lbs., but in this engine that weight is placed on the drivers, and is, moreover, concentrated on a 12-ft. wheel base. In order to obtain power to ascend a 4 per cent. grade this amount of adhesion weight is absolutely necessary if a train of any paying capacity is to be hauled. The restriction of the wheel base to 12 ft. is perhaps necessary, in view of the sharp curves to be traversed, but it may well be questioned whether the weight of rail adopted, 65 lbs. to the yard, is not too light for economical working. So great a concentration of load on so short a wheel base is liable to throw severe strains upon the rail, especially in the unavoidable prevalence of imperfectly or unequally tamped ties.

The wear and strains on rails in sharp curves is of course materially greater than on tangents, other conditions being equal, and the very rapid wear of so light a rail will probably render it more expensive than a heavier section, which would last longer and keep in good condition for a considerable time. The tendency of progress is decidedly toward the use of heavier rails, especially as those roads that have used the stronger and more durable, though more expensive rail, appear to be greatly pleased with their choice. The reasons for this preference are not far to seek, and have been exhaustively set forth in the pages of this journal. The real cause of the superiority of heavy rails may, however, be summed up very briefly: an increase of a few pounds in weight doubles the strength and life of a rail. Steel is now so cheap that the temptation to save money by using light rails hardly exists at present. This fact, however, appears to be often lost sight of, and in many instances the weight of the rail remains unchanged where the weight of the locomotives and of the cars has been nearly doubled. The result is that the derailments are as frequent as ever, and that, tried by this test, the science of railroading does not show any material advance. Light rails necessarily imply an uneven and crooked track and occasionally broken rails, and consequent derailments are only the outcome of these conditions.

Remarkable statements of materials manufactured and consumed by the North Chicago Rolling Mill during the quarter ending Oct. 31 are made in their quarterly report, which appears in another column. These figures show that the steel rails produced during the quarter would build a single track of 60-lb. rails from Boston to Chicago, and the product of splices would be sufficient to lay this track. The raw material used would require 25,844 cars of 15 gross tons capacity to move it; the manufactured product would require 20,956 similar cars to move it, making a total of 46,800 cars, which, allowing 33 ft. to the car, would make a train 293 miles long, reaching from Albany to Buffalo, or from Albany to Portland by way of Boston. The material manipulated amounts to 9,000 gross tons a day for every working day in the three months.

Attention is being directed to the increased rainfall on the plains of the West. This fact, if it be a fact, is of the greatest importance to the future of Western railroads as well as Western farmers. Evidence on the subject is quite conflicting; but there seems to be reason for believing that there has been such an increase, and that it has not yet reached its limit. There is no doubt at all that farming has been carried on successfully and profitably where thirty years ago it would have been considered physically impossible. President Adams, of the Union Pacific, in a recent letter to the *New York Evening Post*, makes an ingenious attempt to explain the fact. A few years ago, he says, the land presented an unbroken surface, so that whatever rain might fall would at once run off to the river, with little or no chance for evaporation. But as the country becomes settled, and the ground somewhat broken, the water is retained longer and evaporated more freely. It is thus partly returned to the clouds and serves as rain once again. It is hard to judge how far this explanation is true. It has generally been thought that the existence of forests was necessary for producing an appreciable effect of this kind. But whatever the cause, the facts in the case are worth noting. It may be that our government, after disposing of the public land which was thought to be available, and awakening too late to a sense of what it has done, will find that there is to be some more land given it after all. If this proves to be really the case, we shall be forced to conclude that the special Providence which traditionally watches over school-boys and drunkards has been extending its attention to Congress.

Governor Hill, of New York, has followed the example of the Governor of Massachusetts in appointing a locomotive engineer on the board of railroad commissioners. While we have no doubt that Mr. Rickard is a first-class engineman and a man of good judgment and common sense besides, it is to be borne in mind that in a board of only three members it is impossible to have all the useful qualifications that might be wished for; and that therefore it is important to keep the membership as evenly balanced as possible. In Massachusetts, it is understood that one member must be a lawyer, one a "business man," and one skilled in the art of railroading. The latter expression allows considerable latitude, and Governor Butler, on the expiration of the term of an eminent civil engineer, appointed a locomotive engineer in his place, who has since been reappointed by another governor.

While the qualifications of Mr. Stevens of Massachu-

setts, or Mr. Rickard of New York, are not to be decided here, it must be observed that an eminent civil engineer is prima facie better qualified for a place of this kind than is an eminent locomotive engineer. It is not without precedent for a locomotive engineer, without previous technical education, to attain high position as a scientific authority, but it is uncommon, and has only been accomplished by means of severe study and intense body-killing application. It is rare indeed that a "self-made" man is not, to a greater or less extent, bigoted. The systematic training, broader cultivation and greater store of actual facts acquired by the civil engineer in his technical school course qualify him, other things being equal, for greater usefulness as a railroad commissioner. But other things never are equal. A member of the Brotherhood of Locomotive Engineers certainly should have sensible views on the relations between railroads and their employes.

Mr. Appleton Morgan has in *Science* for last week an article on "The 'Act of God' and the Railway Company," which aims to show that all of the five railroad disasters of the present year resulted from irremediable causes; from inexplicable human frailty which always will remain a certain small factor in all human operations. Mr. Morgan is probably partially right as regards Chatsworth, as the section men there may have been as good as the average in seeing that fires were safely extinguished before leaving them; but as to the others his premises as well as his reasoning are so wide of the mark that they evidence either carelessness or a labored attempt to defend the railroad lawyers' view. At Republic he says the man sent with a red light failed to carry it; no mention is made of the fact that two men failed in their duty to send him, and that the company had been slack in its discipline. White River is attributed to the failure of a bridge inspector! Concerning Forest Hills, Mr. Morgan makes the original assertion that no appliance in the company's power to provide was lacking; which, perhaps, must be admitted as true, as a competent bridge engineer (which the company neglected to provide) could not be called an "appliance." At Kouts, "some brain failed to do the regular act which it had performed for years as regularly as clock-work;" it would probably be nearer the truth to say that some brakeman was just as slow in going back as he had been for years, or that an engineman approached a fixed signal at an uncontrollable speed, as he had done many times before and come out all right. Mr. Morgan apparently honestly aims to secure by his article a better understanding between the railroads and the public, and to prevent unjust criticism of non-preventable accidents, but his involuntary clients would have undoubtedly preferred a less faulty and inaccurate defense.

An interesting article from the pen of Professor A. T. Hadley, whose appearance in the pages of the *Railroad Gazette* is always welcome to its readers, will be found in another column. Although the American people certainly are favored above all others in the facilities afforded them for traveling to and from it is well to remember, when reading Professor Hadley's figures, that freight train mileage does not always have much meaning, so far as the prosperity or convenience of the people is concerned. If the New York Central, for instance, carries twice as much grain to the seaboard for export this year as last, it does indeed indicate that the road is probably increasing its income, and that the western farmers are raising and selling some corn or wheat, but the convenience of the people is not exalted. Our grain carrying trunk lines haul such enormously heavy trains, however, that they probably could throw out the export tonnage and still match European mileage figures if the respective average size of trains were allowed for. A large freight train mileage for goods to be consumed in the country is an evidence that the people are favored with good facilities for getting the desirable products of distant sections, and also tends to show that luxuries are common and cheap. Possibly our great privileges are fostering extravagance; we may wake up some morning and find ourselves a nation of commercial travelers; riding on the cars eight months in the year to earn our living and sending our wives and daughters the other four months to spend it.

In another column we set forth the problem that is to come before the freight auditors at Chicago on Dec. 7. While we have not tried in so limited a time to make inquiries of anything like a representative number of roads, information has been elicited from enough of them in widely separated parts of the country to show that geographical divisions have very little if any influence on the system used. Apparently no officer who desired to be independent or original in his selec-

tion of plans has been deterred by what his neighbors did or did not do. An important detail of this question, which has given considerable trouble and which merits careful consideration at this convention, is the treatment of prepaid shipments on which the agent at originating point collects the charges for one or more roads beyond his own. Some roads have followed a well defined plan for several years while others still continue in more or less haphazard ways.

The letter in another column from "An Occasional Drummer" was not accompanied by the writer's real name, but as his utterances are to the point we print them. We suspect that he is a railroad man on some other fellow's road, criticising well-known deficiencies, but, of course, not telling about his own administration. We cannot imagine any one frank enough to do that. That conductor was undoubtedly a typical one, and this writer, whose experience as a drummer must be excruciatingly infinitesimal, is typical of a large class of the American traveling public; people who are civil, modest, not inclined to bother other people without cause, and willing to suffer considerable inconvenience rather than cause any. These people mind their own business, and are too polite to tell railroad men theirs. The typical conductor is a man who, like the one referred to, attends to his duties, strictly speaking, with faithfulness, but allows his mind to be so filled with those, that he gives no thought to things beyond and outside of his duty. He has not learned that it is his duty to do more than his duty. This has to be done in other lines of business; in fact is done by an occasional thoughtful individual among the railroad ranks. Grocers or dry-goods dealers have to not only sell good goods at reasonable prices in a civil manner; to take the lead they have to continually strive to be more than civil, to send buyers away not only satisfied but pleased. This must be done by railroads. It will not answer for the general passenger agent to publish an elegant folder stating that his trainmen are polite and attentive; he must get the superintendent to train them to have high aims in this direction. It is not boys' play, as a general thing. It requires work and thought; it involves doing apparently unnecessary things; a conductor must often give time, even when he is weary and overworked, to looking after ladies, children and infirm and ignorant people; if he leaves this for the brakemen to do without supervision they will grow slack. The trouble with the average superintendent is that he has a few conductors and brakemen who more or less fully carry out this ideal, and he takes it for granted that the others will learn to imitate them; and so they will, many of them, in the course of time; but what is wanted is an aggressive superintendent who will take measures to induce them to learn quickly.

As long as conductors and others are no better than they are now information must be fought for. When Mr. Drummer has dropped the "Occasional" from his cognomen he will have learned to begin pumping on this point some 50 miles before he reaches "Sque-dunk;" by the time he arrives there he will have learned the location of two or three telegraph offices, which of them are likely to have the best information about trains, what hotels have the most intelligent and communicative hack drivers, whom to ask for estimates of the time belated trains are likely to make up, and so forth. But we confess that none but a drummer can have the patience to acquire this information from trainmen and others without making them mad or sour. Women and other people of retiring dispositions will continue to be sat down upon; and that is the reason that there is need of reform.

In another column will be found a second communication from Mr. Walter G. Berg on the subject of railroad schools. The need of more intelligent and better trained employes in positions of great trust and responsibility on our railroads is urgent and widespread. How to obtain this kind of ability is a very difficult question. Probably no two persons would at first agree as to the best method of procedure. The Railroad Gazette has already outlined what is considered an entirely feasible plan for the establishment by the larger roads of schools adjacent to shops and offices in which employes should spend a few hours each day or evening under instruction of their superiors in the service or of regularly employed teachers, or both combined.

Two objections to the separate school are: first, that few of those who will eventually make the best men are so situated as to be able to attend such schools; and second, that a boy would seek for employment only in the particular part of the service for which he had specially prepared himself. To satisfy

the demand the school must come to the boy, for it is impracticable to send to school away from home, even for one year, boys who are to become journeymen and fill other subordinate positions.

Moreover, one year is wholly insufficient in which to do the work required. With the limited elementary education of apprentices, two or three years' schooling is required to accomplish what may be done in the years of his apprenticeship by taking two hours a day from his working hours, and employing the evenings in reading or study. It is essential to the complete solution of the problem that the boys should be earning their living while learning the business, and if reliance is had on schools at distant points, where the expense of living is large, it is certain that the most of those who now fill subordinate positions will be shut out. Regular apprentices, when properly educated, are likely to make the best officers. The knowledge gained as an apprentice's of value in all departments of the management or operation of the road, and it is here that improvement is most needed, for the accounting departments are easily recruited from existing schools, and businesses where similar talents are cultivated. When the boy is once in service, his especial fitness for particular departments will appear, and a proper direction may be given to his education. This would be wholly wanting in the special school. If employes of considerable experience could be sent off to the special school to study particular things, the result would doubtless be all that could be desired; but is this feasible? If a boy has spent four years learning a trade, or some special part of the work of a railroad, and has reached manhood, would he allow himself to be sent, even at the company's expense, to school to begin the study of fractions and the rule of three?

There is probably no practicable way of transforming the ignorant poor boy into an intelligent and skilled employe except by cultivating his mind at the same time that he is earning his living and acquiring the details of knowledge and skill which constitute his trade. However, all effort in this direction is likely to make for the desired end, and possibly only through a process of evolution, in which the fittest methods survive, will the future railroad corporation obtain or create the greatest skill in every responsible position in the service.

We have more than once alluded to the development of workmen's trains in Belgium, Saxony and elsewhere. These are among the cheapest trains in the world, being filled with weekly or monthly commuters who pay rates of less than half a cent a mile. A number of special devices are adopted to secure economy. The trains are not run to the passenger stations, but to the freight stations in the cities, which is as a rule much more convenient for factory laborers. A recent report of the Saxon Factory Inspectors speaks in the highest terms of the service rendered by these trains in meeting the evils of overcrowding in the large cities. The system has extended to Leipzig and Chemnitz as well as Dresden, and the number of trains during the present winter is to be much larger than in any preceding one. It might be well for our railroad managers to consider how far the system could be applied in America. There would be little or no money to be made by it directly, but indirectly, cheap workmen's trains would help the factories along the line in the same way that cheap coal does; while the transfer of any considerable number of the population from the city into the country, apart from its moral and social effects, would incidentally create a local traffic of some value. The factory as a producer and the workman as a consumer would both be in a position to give the railroad a larger amount of paying traffic. If the continued fall in prices tends to make long-distance traffic less and less profitable more attention will have to be paid to these special methods of developing the short-distance traffic. Some experiments were made at Boston several years ago, and the legislature took up the matter, passing a law requiring every road running into Boston to provide a workmen's train at about one cent a mile, if two hundred people applied for it. The results have not been much heralded, and doubtless are not startling. The spirit of democratic institutions or something else seems to prevent the taking of decisive action toward creating a special class of accommodations which shall either cost less or be worth less than those the average passenger enjoys. It is at least desirable, however, to favor people of small means by shortening the period for which the lowest-priced tickets are sold. To sell for a whole year in advance at a rate materially lower than is asked for monthly tickets practically results in favoring the well-to-do, whatever it may be in theory. This concession would not be burdensome to the railroads.

The Future Demand for Steel Rails.

Much uncertainty and interest is just now attached to the probable demand for steel rails next year. The production of this year, if it is as great as some hope, 2,000,000 tons, will in addition to the large number of men employed in mining coal, ore and limestone, call for the transportation by railroad or water of nearly 10 million net tons of raw material, about as much as the total tonnage of the New York Central & Hudson River Railroad in 1880.

There are no statistics showing the ton-mileage of this material, nor of the payments made for it, but its quantity must give it value to those roads which secure its carriage.

While this consumption of rails will depend greatly on the mileage of new road constructed, it is not entirely dependent on this, as will be seen by the subjoined table, in which is given our total production of iron and steel rails for the 20 years ending with 1886; the approximate consumption; the percentages made in this country; the average prices of iron and steel rails, in currency, at works; the miles of road built, and the total mileage at the end of the year, with the consumption of rails, both per mile of new road built and for the total mileage (both old and new), at the end of the year.

The table, which has all weights in gross tons of 2,240 pounds, is compiled from the reports of Mr. J. M. Swank, of the American Iron and Steel Association. There are no quotations for iron rails after 1882, the few made since that date being chiefly street and other light rails.

It will be noticed that neither 1871 nor 1882, the two years of maxima in our undulatory advance, were years of greatest consumption, but that 1871-2 and 3 were years of about equal consumption, though the road built in 1873 equaled only 56 per cent. of that built in 1871, but the consumption per mile of new road built increased from 162 to 250 tons. The greatest consumption was in 1881, when 1772 less miles were built than in 1882, but the minimum per mile of new road was in the year of greatest construction instead of in the year before. In both cases the consumption per mile built during the year increased during the succeeding years, a fact possibly due to earnings during the "booms" and not entirely unconnected with the subsequent fall in prices. Most roads scrimp renewals in years of small income and make correspondingly greater expenditures when receipts increase (provided that time comes); it is, therefore, natural to conclude that in the years of greatest railroad building many roads were making increased earnings in carrying the material for the new roads and that in the following year they bought rails with the money so earned.

STATISTICS OF RAILS IN THE UNITED STATES FOR 20 YEARS.
Annual consumption, percentage of same made in the United States, and total production in the U. S.; prices of steel and iron rails and annual consumption per mile of road and per mile of new road.

Consumption per mile of road at end of year.....	14.2	16.0	17.4	17.2	19.8	20.9	19.8	10.2	1.6	0.6	12.0	16.8	15.0	10.3	8.2	7.1
Consumption per mile of new road.....	928	1754	1489	1489	1623	1623	1623	1623	1623	1623	1623	1623	1623	1623	1623	1623
Total mileages.....	30,250	42,250	46,844	46,844	50,263	50,263	50,263	50,263	50,263	50,263	50,263	50,263	50,263	50,263	50,263	50,263
Miles of road built.....	3,449	3,070	4,015	4,015	4,070	4,070	4,070	4,070	4,070	4,070	4,070	4,070	4,070	4,070	4,070	4,070
Price of iron rails per ton.....	\$83.12	78.88	77.25	77.25	77.25	77.25	77.25	77.25	77.25	77.25	77.25	77.25	77.25	77.25	77.25	77.25
Price of steel rails per ton.....	\$108.00	158.50	132.25	132.25	106.75	102.50	112.00	104.25	98.75	98.75	98.75	98.75	98.75	98.75	98.75	98.75
Percentage made in U. S.	72.1	66.9	65.4	65.4	69.8	67.8	65.3	67.2	69.9	69.9	100.0	98.2	98.4	98.2	97.7	97.4
Approximate consumption.....	558,173	675,709	800,938	800,938	909,838	909,838	909,838	909,838	909,838	909,838	909,838	909,838	909,838	909,838	909,838	909,838
Total production of rails of all kinds in U. S.	412,524	530,987	553,571	553,571	699,618	699,618	699,618	699,618	699,618	699,618	699,618	699,618	699,618	699,618	699,618	699,618

No prediction as to the future consumption of rails can, apparently, be based on these figures, except that

the consumption will probably be relatively greater next year than this, and that the average price will be lower unless there is an unexpected increase in miles built.

The last column, giving the relation between consumption and total mileage, shows the influence of steel rails in reducing the requirements for renewals. Considering the very general adherence to the 56-lb. rail and the greatly increased weight of locomotives and trains, as well as of the density of traffic, their effect is more marked than would be expected, and so far goes to disprove the assertion that the quality of our rails is deteriorating.

The requirements for the next year undoubtedly depend largely but not entirely on the miles built next year, and that depends on the commercial confidence in the future, as any consumption over the bare requirements of necessity must.

An effort at showing the grounds, if any, for confidence in future railroad building may be made by referring to the last census report, which shows the following relations between the settled area and population:

Year.	Area settled. Square miles.	Population. per square mile.
1830.....	632,717	12,866,020
1840.....	807,292	17,069,453
1850.....	979,249	23,191,876
1860.....	1,194,754	31,443,321
1870.....	1,272,239	38,358,371
1880.....	1,569,570	50,155,783

If we assume that the population now is 60 millions, with 34 inhabitants to the square mile settled, neither of which are far from the truth, we shall have a settled area of 1,764,700 square miles, from which the following table can be made by taking a construction of 11,000 miles for this year.

Year.	Total mileage.	Sq. miles settled per mile of railroad.	Population per mile of railroad.
1830.....	23	27,509	559,400
1840.....	2,818	283	6,060
1850.....	9,021	108	2,570
1860.....	30,635	39	1,026
1870.....	52,914	24	748
1880.....	93,349	16.8	537
1887.....	148,510	11.9	404

It will be seen that these assumptions make our progress in railroad building for the last seven years nearly on a line with that of the preceding ten years, as regards settled area, and slightly deficient as regards population, but we have not kept pace with our increase in wealth.

The passenger and freight traffic has increased as follows, in millions of tons and passenger miles: 1833, 52,606; 1884, 53,504; 1885, 58,286; 1886, 62,462; or 19 per cent. in the four years, while the length of road has increased but 13.2 per cent., and the gross income derived from passenger and freights has been, in million dollars: 1883, 765; 1884, 710; 1885, 721; and in 1886, 763 million dollars, a slight deficiency for which we have the glory of carrying railroad freights cheaper than in any other country.

The sum of these comparisons seems to require a conservative but not pessimistic view of the future, as far as new construction is concerned; but there is nothing in the above which seems to indicate any material decrease in the consumption of rails during 1888.

Uniform Length of Draw-Bars.

The prospect of the general adoption of automatic couplers that will couple with one another is now practically assured, but in order to reap the full benefit of this reform it is necessary that not only the coupling parts of the coupler should interchange, but that the couplers should interchange as a whole. While the outside of the platter has been made clean, the invisible or tail ends of the couplers still show an enormous variety of forms and sizes. Some uniform length of draw-bar and style of spring pocket would, if generally adopted, largely enhance the benefits conferred by the general use of a uniform type of coupler. But unfortunately little progress has been made in the adoption of a uniform length of the draw-bar. This is much to be regretted, and the non-adoption of a standard is more reprehensible because no principle and no particular patent rights or interests are involved. As long as it was doubtful which was the better type of coupler and which was the better coupler of the different types, some experiment was absolutely necessary to determine the question, and therefore no road or master car-builder could be blamed for trying a variety of automatic couplers. But the question of the length of draw-bar is merely one of convenience and adaptation to the general style of car. The mere difference between 20 and 21 inches involves no principle, and few unbiased car-builders could conscientiously affirm that one length possessed any inherent merit over the other. The great variety

of draw-bars that every road has to carry in stock is a most important disadvantage to economical operation, but it is doubtful whether the adoption of one type of coupler would very largely diminish this stock, unless some agreement is arrived at as to the standard length of draw-bars. If the Master Car-Builders' type is adopted, and one road has a spring pocket and another road has a tail pin, and draw-bars differ by half inches all the way from 10 to 32 in. it is evident that there would be little diminution in the number of draw-heads that would have to be kept in stock at all important points where cars are repaired. If the Master Car-Builders' Association would carefully investigate this matter, and after full consideration decide upon the length of draw-bar and the shape of follower plates, etc., a very important reform would be effected.

The general adoption of standards is chiefly impeded by three causes. First, the standard is often adopted hastily and without sufficient consideration of the principles and interests involved; secondly, when adopted, it is often disregarded by the car-builders themselves; and thirdly, should its adoption necessitate an immediate extra expenditure of money with the certainty of ultimate saving, the improvement is vetoed by the superintendents, general managers and presidents, who can always annul the action of their master car-builder, and too often look only at the immediate result to be effected by a proposed change. The first of these evils can only be guarded against by full discussion and a resolve on the part of the minority to sacrifice their individual predilections to the decision of the majority. The remedy for the second evil of course wholly depends on the resolve of those in charge of the mechanical department to abide by the action of the Association. The third evil will only disappear when the immense benefits the Master Car-Builders' Association has conferred on railroads by the adoption of standards are more generally recognized by the superior officers.

It is probable that some five million dollars worth of draw-heads are now kept in stock at repair points, and it may reasonably be assumed that, if one draw-head could be placed under any car, one-fifth of this stock would prove an ample supply. The saving of interest on the stock would, at 4 per cent. per annum, be \$160,000 annually. The saving in labor of replacing draw-heads would probably be still more considerable. But the most important item remains to be considered. The Erie road has to carry in stock over 40 different patterns of cast iron draw-heads alone. Assuming that 20 patterns of wrought iron and patent draw-heads are also necessary, we have a total of over 60 different patterns of draw-heads which are in common use, besides numerous other draw-heads which are only used to a small extent. When a car arrives at a shop with a broken draw-head differing from any in stock at that point, the car has to wait until the draw-head is ordered and arrives, and if of the right pattern, is fitted in place. This involves the loss of several days and the transport of the draw-head over a considerable distance, and also necessitates a considerable amount of correspondence and book-keeping and the loss of interest on the use of the car, while it is occupying shop or yard room, which also costs money. It is difficult to estimate the average cost of these items per car per annum; but it is evident that multiplied by one million cars it cannot fail to be appreciable. This amount could be saved without the exercise of any remarkable amount of invention or ingenuity and without payment for any patent rights.

It is surely worth while for the general managers and presidents of the railroads of this country to direct a small portion of their energies towards this reform. The vice-president of one important road has publicly stated that careful investigation showed that the legal expenses and compensation to the men injured on his road in coupling cars is equal to \$8 per car per annum. It has been estimated on other roads that the cost of broken links and pins is \$1.80 per car per annum. These two items may not be so large on the majority of roads, but will be almost entirely wiped out when the general adoption of the Master Car-Builders' type of coupler becomes an accomplished fact. A further saving of probably at least \$1.50 per annum may be effected by the adoption of a uniform length of draw-bar and style of draft rigging.

The annual report of the General Superintendent of the Railway Mail Service, referred to in another column, is suggestive in the facts it gives concerning train accidents. The number of derailments given, if it could be compared with the number of mail-train accidents in the *Railroad Gazette* record, would give a vivid idea of the magnitude of the body of facts which remains concealed so long as no authority exists for collecting reliable statistics.

October Accidents.

Our record of train accidents in October, given in this number, includes 64 collisions, 49 derailments and 4 other accidents; a total of 117 accidents, in which 34 persons were killed and 109 injured.

These accidents are classified as follows:

COLLISIONS:		
Rear.....	37	
Butting.....	28	
Crossing.....	1	
DERAILMENTS:		
Broken rail.....	2	
Spread rails.....	2	
Defective switch.....	5	
Broken bridge.....	1	
Broken wheel.....	2	
Broken axle.....	2	
Broken brake beam.....	2	
Broken track.....	2	
Misplaced switch.....	5	
Bad switching.....	1	
Car on track.....	1	
Washout.....	1	
Accidental obstruction.....	1	
Malicious obstruction.....	1	
Purposely misplaced switch.....	3	
Unexplained.....	16	
OTHER ACCIDENTS:		
Broken crank pin.....	1	
Broken driving wheel.....	1	
Broken connecting rod.....	1	
Boiler explosion.....	1	
Total.....	117	

The causes of collisions were given were as follows:

	Rear.	Butting.	Crossing.	Total.
Trains breaking in two.....	4	1	..	5
Misplaced switch.....	3	1	..	4
Failure to give or observe signals.....	2	..	..	2
Mistake in giving or understanding orders.....	..	1	..	1
Failure of power brake.....	..	..	1	1
Miscellaneous.....	3	..	..	3
Unexplained.....	23	26	..	49
Total.....	35	28	1	64

A general classification shows:

	Collisions.	Derailments.	Other.	Total.	P. c.
Defects of road.....	..	10	..	10	8
Defects of equipment.....	5	8	4	17	15
Negligence in operating.....	10	6	..	16	14
Unforeseen obstructions.....	..	9	..	9	7
Unexplained.....	49	16	..	65	56
Total.....	64	49	4	117	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other.	Total.	P. c.
Passenger.....	21	14	3	38	32
Freight and other.....	98	38	1	137	78
Total.....	119	52	4	175	100

The casualties may be divided as follows:

	Collisions.	Derailments.	Other.	Total.	P. c.
KILLED:					
Employees.....	8	9	3	20	58
Passengers.....	11	..	..	11	32
Others.....	3	..	..	3	10
Total.....	22	9	3	34	100
INJURED:					
Employees.....	39	11	..	50	46
Passengers.....	25	32	..	57	52
Others.....	1	1	..	2	2
Total.....	65	44	..	109	100

Fifteen accidents caused the death of one or more persons, and 24 caused injury but not death, leaving 78 (66 per cent. of the total) which caused no personal injury worthy of note. Only two accidents besides that at Kouts caused the death of a passenger.

The comparison with October, 1886, shows:

	1887.	1886.
Rear collisions.....	37	50
Butting ".....	28	12
Crossing ".....	1	1
Derailments.....	49	51
Other accidents.....	4	4
Total.....	117	118
Employees killed.....	20	24
Others.....	14	24
Employees injured.....	50	71
Others.....	59	35
Pass. trains involved.....	38	33

Average per day:

Accidents.....	3.77	3.81
Killed.....	1.19	1.55
Injured.....	3.52	3.42

Average per accident:

Killed.....	0.291	0.407
Injured.....	0.931	0.898

October last year had the Rio disaster, which killed 17, so that this month, even with the Kouts collision, does not make a startling comparison. This year as last September's record was very bad, and October shows a gratifying falling off in most features, especially in the number of employees killed, which is never small. We now record only two fifths the number reported a month ago. The number of injured is also much smaller. The number of unexplained accidents is larger even than last month. This may indicate either that more care is being taken by the newsgatherers to report minor accidents, or that they take less care with those they do tell us about. One accident is attributed to the lack of a lighted switch lamp, which suggests the fact that switch lamps are of little value unless enginemen are strictly held to the rule that the absence of a light means danger, and requires an instant application of the brakes. One collision is reported as happening to a train which was detained on the main track by a defective switch, this circumstance being related as though it had something to do with the cause of the collision; but we have, of course, classed the accident as unexplained, the account giving no light whatever to show whether the flagman failed to signal properly or the engineman who collided failed to regard a signal which had been properly shown. Perhaps the rear brakeman read his Rule 99 and stopped to inquire whether the stoppage was caused "by an accident or obstruction" or happened simply because some one was too lazy to turn the switch.

The Kouts disaster, which we discussed at the time of its

occurrence, is yet to come before the courts, as a grand jury has inquired into it and has made a sealed report, which is not yet published. As we remarked at the time, the high speed of the freight train at Kouts was specially reprehensible; and from what we have heard since, it would appear that this fact was appreciated by the management. Better braking power for freights had been discussed, and some apparatus had even been ordered, we believe; but financial reasons had postponed the actual delivery and use of it.

The suggestive facts above related carry a lesson for directors who do not direct or who simply restrict their executive officers. Men charged with such important trusts should at least be consistent. If they restrict expenditures for power brakes they should also restrict the speed of freight trains which have to be run without them. And a manager who has to run fast trains in order to get business and still cannot make enough money out of that business to run those trains safely, is in the quandary of the engineer a few weeks ago who was compelled to use rotten timber for building a trestle. He must resign or risk his reputation. The public is primarily to blame for asking or accepting service at too low rates, and very likely in this case for allowing the Chicago & Atlantic to be built, but the manager is nevertheless the special sufferer. He comes between the mill-stones and receives the crushing. The trainmen doubtless broke a plain rule when they passed the semaphore at more than six or eight miles an hour; but what was generally said to them when they failed to get fast freight through in good time?

An interesting car coupler test took place at the Meadow Shops of the Pennsylvania Railroad, on the 22d inst. The object of the trial was to ascertain whether the Dowling coupler in its most recently modified form would couple automatically with the Janney freight coupler on a sharp curve. The trials took place on a curve of about 191 ft. radius (30 degrees), and showed that the Dowling would couple with itself, couple with the Janney and that two Janneys would couple together with equal facility. On such a sharp curve the coupling cannot be effected unless the cars are brought somewhat sharply together, and it is easier to couple when the knuckle on the outside of the curve is open and that on the inside closed than when the reverse conditions prevail.

Some further modifications have been made in the knuckle of the Dowling, which is now 5 in. deep by 3 in. thick at the critical point. A modification in the form of the knuckle now renders it possible to draw a car by a link in the knuckle, even if the pin of the Dowling is lost or destroyed. Mr. Bradley, Superintendent of the West Shore, and Messrs. Soper and McMunn, of the Consolidated Coupler Co., were among those who were present at the tests.

It is reported that in consequence of the strike in the coal regions some of the engines on the Lehigh Valley have been burning bituminous coal. The effect of strikes in modifying economic conditions and changing the production and consumption of raw materials thus receives a fresh illustration. The tendency to introduce labor-saving machinery is of course more obvious, but is by no means the only effect of strikes.

The 39th annual report of the Mobile & Ohio, which we print in another column, gives an instructive lesson in some of the effects of regulating rates by legislation. The president shows, for example, that the cotton carried in the year has decreased six per cent., and the revenue from it about 22 per cent., while in the total freight business the ton-mileage has increased 16 per cent., the rates have declined 14 per cent., and the gross revenue therefrom has declined a little more than half of one per cent. But comparing 1886-7 with 1884-5 the differences are still greater. The increase of ton-miles is 28 per cent., the decline of rates is 24 per cent., and the decrease in gross earnings from freight is 4 per cent. These results the president attributes to the close competition, and to the crippling of the line in competition by the rates forced upon it by the Mississippi Railroad Commission; and to a less degree to the uncertain readjustment of rates under the national law. The Mobile & Ohio competes to some extent for Mississippi River trade and to a greater extent with various inter-state roads. Moreover, much the greater part of its freight movement is in one direction. In 1886-7 the ton-miles north-bound were 36 millions, and south-bound 77 millions. In 1885-6 the north-bound were 34 millions and the south-bound 64 millions. Under these conditions the road has been compelled to reduce rates at competitive points in order to get business, while the state commissioners have compelled a corresponding reduction at interior and non-competitive points. In local business the ton-miles have increased 14.80 per cent., revenue increased 5.12 per cent. and the rate per ton-mile has decreased 0.223 cent. In connecting business the ton-miles have increased 19.31 per cent., revenue has decreased 0.09 per cent., and rate per ton-mile has decreased 0.316 per cent. In through business the ton-miles have decreased 2.15 per cent., the revenue has decreased 18.26 per cent. and the rate per ton-mile has decreased 0.099 per cent. The net result is that only with great economy has the road paid operating expenses and its small fixed charges. It is now suggested that if the policy of the state Commission is continued the road will be compelled to abandon inter-state business, in order to prevent a ruinous reduction of state rates. This of course would necessitate such an increase of local rates as would compensate for the loss of the profit on the long haul, which, though small, still contributes something to the net earnings.

The report is admirably full in analysis of traffic operations and of expenses, and gives much detailed information, which, unfortunately, is not often found in such documents.

American and Foreign Train Service.

BY ARTHUR T. HADLEY.

Comparisons are often made of the amount of railroad mileage in different countries, and its relation to area and population. These comparisons are good as far as they go, but they prove very little. The important thing to compare is the amount of use which different nations make of their railroad systems. This is not so easy to accomplish, but the results when attained are far more valuable.

For general comparison, the best unit of service is the train mile. The total train mileage is a rough measure of the aggregate amount of railroad service. The ratio of train mileage to population represents the average amount of railroad service per inhabitant. The variations in this ratio indicate in a general way whether a country is well supplied with railroad service or not. Finally, the ratio of train mileage to railroad mileage shows the average frequency of trains.

The latest available figures for Europe are those for the year 1884. These are taken from Grieson's *Railway Rates*, p. 124. The American figures of track and train mileage have therefore been taken for the same year; while the estimates of population have been based on the assumption, sufficiently accurate for our present purposes, that the percentage rate of annual increase in each section of the country from 1880 to 1884 was the same as in the years immediately preceding. Using these means of comparison we find that the average frequency of trains is greater in some parts of Europe than in America; but not enough greater to correspond with the greater density of population; so that the amount of train-service per head of population, independently of our higher train loads, is greater in America than in any part of Europe.

We subjoin the detailed figures, in which it will be observed that those for Europe cover only the countries with the heaviest traffic; so that, in fairness, the Southern and Pacific states ought really to be omitted from the comparison.

I.—AVERAGE FREQUENCY OF TRAINS PER YEAR. (Train mileage per mile of line operated.)

Europe.			
	Passenger.	Freight.	Total.
United Kingdom.....	7,588	6,715	14,303
Belgium.....	4,819	4,783	9,602
France.....	4,644	2,792	7,436
Germany.....	3,997	2,610	6,607
Holland.....	4,941	1,752	6,693

America.			
	Passenger.	Freight.	Total.
New England.....	3,340	2,690	6,030
Middle States.....	3,670	5,570	9,240
Southern.....	1,320	2,540	3,860
Western.....	1,410	2,540	3,920
Pacific.....	880	1,290	2,170
General average of United States.....	1,825	2,950	4,775

II.—PROPORTION BETWEEN TRAIN-SERVICE AND POPULATION. (Annual train mileage for every 1,000 inhabitants.)

Europe.			
	Passenger.	Freight.	Total.
United Kingdom.....	3,981	3,523	7,504
Belgium.....	2,258	2,241	4,499
France.....	2,222	1,336	3,558
Germany.....	1,971	1,287	3,258
Holland.....	1,773	629	2,402

AMERICA.			
	Passenger.	Freight.	Total.
New England.....	5,100	4,200	9,300
Middle States.....	4,900	7,500	12,400
Southern.....	1,700	3,200	4,900
Western.....	4,000	7,200	11,200
Pacific.....	2,700	4,300	7,000
General average of United States.....	3,700	6,000	9,700

Translated into plain language Table I. means that the average English railroad line is traversed by a little less than 40 trains a day—not quite 20 each way. Rather more than half of these are passenger trains. The Belgian average is 26 trains daily, almost equally divided between freight and passenger business. The daily average for France is a little over 20 trains, or 10 each way; about five-eighths of them passenger trains. Germany and Holland each show an average of 18 trains. Three-fifths of the trains in Germany and nearly three-quarters of those in Holland are for passengers.

The daily average for the United States is 13 trains (or 6½ each way), 5 passenger and 8 freight. The average is highest in the Middle States, reaching 25; 10 passenger and 15 freight. New England has an average of 16 trains, and is the only section where the passenger train mileage exceeds the freight. The daily average in the South and West is between 10 and 11; in the Pacific states and territories about 6.

The average frequency of trains in the Middle States is greater than in Germany or France, but a little less than in Belgium and much less than in Great Britain. In fact, there is no state in the Union which comes up to the British figure; New Jersey and Rhode Island approach nearest to it. The Belgian average is surpassed by several states, including Pennsylvania and Maryland, but not New York or Massachusetts.

None of the groups of American states make a good comparative showing in frequency of passenger trains. Could

* This comparison is somewhat unfair to the American roads since it does not include the train-mileage of the elevated railroads in New York City, while Grieson's figures certainly include the Berliner Stadtbahn, and probably also the underground railroads of London. This does not make quite so much difference as might at first be supposed, for the train-mileage figures on all these lines are rather small in proportion to the number of passengers carried. The New York (Manhattan) elevated would add about one-sixth to the passenger train mileage of the state of New York, but its influence on the total for the whole country is, of course, small.

† These figures are only given in round numbers on account of necessary sources of error in the estimates of population. But they are sufficiently accurate for all present purposes.

Southern New England be taken by itself, the average would exceed that of Germany and compare favorably with that of France. In freight-train service, the general average for the United States exceeds that of France or Germany.

Considering the difference in density of population, it is quite remarkable that we can make so good a showing. A thickly-settled population ought to maintain much more frequent trains than a sparse one. A railroad connecting towns of 100,000 inhabitants ought *prima facie* to be able to run something like ten times as many trains as one which connects towns of 10,000 inhabitants. The fairest basis of comparison is therefore to be found in the proportion of train-mileage to population, which forms the subject of Table II. Here the advantage of the United States is strikingly apparent. For every inhabitant of the United States we find on an average that a whole railroad train has been run nearly ten miles in the course of each year. This is nearly one-third more than in Great Britain, more than twice the figure in Belgium, and about three times that in France or Germany. If we omit Scotland and Ireland, and take England alone, it by no means comes up to the figures for the United States as a whole.

Even if we omit the freight and confine our attention to the passenger train service, we find that the United States still has a most decided advantage. The passenger train service per head of population in the whole country nearly equals that of Great Britain and far surpasses that of Belgium, France or Germany. In New England and the Middle States the difference in our favor is decisive as against England and overwhelming against the other countries.

This is a result of which American railroad managers may justly be proud. It shows not merely that America has more railroad mileage than Europe—which might mean very little—but that the American people has more railroad service in proportion to its numbers than any other. We do not see how any exception can be taken to this conclusion. The general basis of comparison is a fair one. Other things being equal, the amount of railroad service should be proportional to the amount of population. And the special points where other things are not equal tend to emphasize America's superiority all the more strongly. The fact that our population is so scattered tells against us. True, it creates a necessity for more travel, but it at the same time involves an added expense in traveling which more than counteracts the necessity. The thickly-populated parts of the United States make a better showing than the sparsely settled regions of the South and West. Great Britain, with three hundred inhabitants to the square mile, does better than France or Germany with two hundred. On this showing we should expect Europe as a whole to do better than the United States as a whole. But the fact is just the reverse.

Again, a given amount of train mileage in the United States implies more railroad service than the same amount in Europe, because our trains are so much heavier. We cannot now treat this matter in detail; but the broad fact here stated can scarcely be open to doubt. Nor can the force of our conclusions be called in question by a claim of superior speed for European train service. For England such a claim would be well grounded; but in comparison with Continental Europe the advantage would be on our side.

These are plain matters of fact. There may be room for difference of opinion as to the causes by which this difference has been brought about; but there can be no question as to its existence. In spite of sparse population and heavier trains, American railroad management offers its patrons more train service in proportion to their numbers than can be had anywhere in Europe. In passenger traffic the difference is moderate but distinct; in freight traffic it is overwhelming. England is the only European country which makes even a tolerable showing on this basis. Belgium has less train service per head of population than the Southern states of the Union; France and Germany fall yet more hopelessly below the American level.

We shall hope, in a subsequent number, to explain some of the reasons for this rather surprising state of affairs.

TRADE CATALOGUES.

Machine Tools, built by Messrs. E. Gould & Eberhardt, Newark, N. J. This small catalogue of 85 pages contains good illustrations and descriptions of numerous machine tools, including a variety of lathes for general and special purposes, drill presses, milling machines, slotters, shapers, gear cutters, etc. Many of the tools illustrated are of very recent design and contain important improvements, amongst which are the drill press illustrated on another page, an automatic gear cutter, etc.

The catalogue warns purchasers against buying or using "machines that infringe on the above patents." Unfortunately no particulars are given as to the numbers or claims of the patents, and it is, therefore, a little difficult to guard against the purchase of infringements on unknown patents. Many firms, like the Westinghouse Brake Co., give a list of the patents under which their devices are made, and this is a very useful addition to a catalogue, especially where the seller does not guarantee the purchaser against suits for infringement, etc. In other respects, however, the catalogue under review is very complete and will prove useful to any intending purchasers of machine tools.

Train Accidents in October.

COLLISIONS.

REAR.

1st, early, on New York Central & Hudson River, near Lockport, N. Y., a portion of a switching freight left standing on a siding, ran down grade and collided with another freight train, wrecking 3 cars.

1st, early, on New York, Lake Erie & Western, at Middle-

town, N. Y., a passenger train ran into a freight standing on the main track, damaging the engine and caboose.

2d, on Pennsylvania, near Glassboro, N. J., a freight train broke in two and the rear portion afterward ran into the forward one, wrecking 5 cars.

3d, a. m., on New York Central & Hudson River, in Gasport, N. Y., a passenger train ran into the rear of a freight train, which did not quite clear the main track, damaging the engine.

3d, a. m., on Philadelphia & Reading, near Minersville, Pa., a freight train descending a steep grade ran over a misplaced switch and into some cars on a siding, making a bad wreck.

3d, on Columbus & Eastern, near Hadley Junction, O., a passenger train ran into the rear of a freight, damaging the engine and 1 car, and injuring 2 trainmen.

3d, on Rome, Watertown & Ogdensburg, in Oswego, N. Y., a special passenger train ran into a switch engine, the throttle of which was thrown open by the shock.

The last named engine started off with no one on board and collided with another locomotive, doing some damage and severely injuring a fireman.

4th, a. m., on Boston & Albany, near Grafton, Mass., a freight train ran into a preceding freight, doing some damage. The accident is partly attributed to dense fog.

5th, p. m., on New York, Lake Erie & Western, at Cottrell's Switch, N. Y., a freight train broke loose from the engine and collided with some cars standing on the main track, wrecking 8 of them. The rails were slippery.

6th, a. m., on Cleveland, Columbus, Cincinnati & Indianapolis, at Maud's Station, O., a locomotive which was backing a passenger car on the main track was run into by a switch engine.

7th, very early, on New York Central & Hudson River, at Fishkill Landing, N. Y., a freight ran into a preceding freight which was just pulling out of the yards upon the main track, damaging engine, 15 cars, and injuring a trainman slightly.

7th, on Kanawha & Ohio, near Charleston, W. Va., a freight train broke in two and the rear section ran back into a following passenger train, damaging the engine and several cars; a brakeman was killed.

8th, on Corning, Cowanesque & Antrim, at Cedar Run, Pa., freight ran into rear of a preceding freight, piling up a number of cars in a bad wreck.

8th, on Chicago, Rock Island & Pacific, in La Salle, Ill., a passenger train ran over a misplaced switch and into an engine standing on a turnout, damaging both locomotives.

10th, a. m., on Baltimore & Ohio, near Black Hand, O., a freight train ran into a preceding freight, damaging engine and several cars and injuring a trainman.

10th, about midnight, on Chicago & Atlantic, near Kouts, Ind., a passenger train which had stopped at the "state ditch" tank for water was run into by a heavy freight which was closely following. The rear car, a sleeper, was forced forward, crushing the day car next to it; the wreck immediately took fire and 9 passengers were killed and 12 injured, most of them in the last mentioned car. The killed were all burned to a crisp. There was a semaphore signal about 1,200 ft. to the rear of the passenger train, and it had been set at danger by a passenger brakeman. There was some fog at the time, though whether it obscured the freight runner's view does not appear. The freight was running some 20 miles an hour when it reached and passed the semaphore, although the freight train men had been informed that the passenger engine was disabled on one side (and would, therefore, be likely to lose time). The passenger train had been standing at the tank two or three minutes; its rear brakeman started with a red signal after he saw danger impending, but until then seems to have depended upon the semaphore.

11th, on Texas & Pacific, near Longview, Tex., a freight train descending a long grade became uncontrollable and ran into the yard at considerable speed, wrecking a switch engine and several cars.

13th, on Missouri Pacific, at Rock Creek Station, Mo., a passenger train ran into a preceding accommodation train, crushing the rear car. A woman standing on the station platform was struck by the debris and killed; baggage man and one passenger injured. There was a dense fog at the time.

15th, on Atchison, Topeka & Santa Fe, near Emporia, Kan., a passenger train ran into the rear of a construction train, which was unable to get off the main track on account of a defective switch.

15th, on Philadelphia & Reading, at Minersville, Pa., a coal train ran over a misplaced switch and into a freight train on a siding, the engine and 30 cars being thrown off the track and piled up in a creek.

16th, on Canadian Pacific, at Whitemouth, Can., a freight ran into a preceding freight standing on the main track, damaging the engine and caboose. The caboose caught fire and with 3 other cars burned up.

16th, on Pennsylvania, near Kittanning Point, Pa., a freight train broke in three places and ran back down a steep grade for some distance, when the parts collided, piling up 30 cars in a bad wreck.

17th, on Vicksburg & Meridian, at Meridian, Miss., some runaway cars collided with a switch engine, doing some damage, injuring 3 trainmen.

21st, on Louisville, New Orleans & Texas Pacific, at Panthersburg, La., a passenger train ran into the rear of a freight, wrecking the engine and several cars.

22d, on Delaware, Lackawanna & Western, in Hoboken, N. J., a passenger train ran into some sleeping cars, injuring 2 trainmen.

22d, on Missouri Pacific, near Sedalia, Mo., a freight ran into a preceding freight and the engine and 10 cars were piled up in a bad wreck, which caught fire and was partially destroyed.

23d, on New York, Pennsylvania & Ohio, in Nankin, Ohio, a freight ran into a preceding freight, wrecking the engine and several cars, injuring 2 trainmen.

24th, on New York, Lake Erie & Western, in Lackawaxen, Pa., a freight ran into the rear of another freight standing on the main track, damaging engine and caboose.

27th, on Wabash Western, at Macon, Mo., a passenger train collided with a freight train standing on the main track, wrecking the engine and several cars and injuring 2 passengers.

27th, on Illinois Central, near Dixon, Ill., a freight ran into a preceding freight, damaging the engine and 12 cars.

28th, on Pennsylvania, near Glen Lock, Pa., a freight train ran into the rear of a preceding freight train, damaging the engine and 6 cars, injuring 2 trainmen.

29th, on Chicago & Eastern Illinois, near Crete, Ill., a freight ran into the rear of a preceding freight, wrecking the engine and 3 cars.

29th, on Pittsburgh, Fort Wayne & Chicago, in Chicago, Ill., a passenger train ran into the rear of a freight, wrecking the engine and several cars.

31st, on Syracuse, Geneva & Corning, near Geneva, N. Y., a freight ran into a preceding freight, wrecking engine and several cars.

BUTTING.

3d, a. m., on Pennsylvania, near Hillsdale, Pa., a butting collision between two freights caused considerable damage and killed an engineer. The wreck took fire and was partially consumed.

3d, on Southern Pacific, near Dunsuir, Cal., butting col-

lision between two freights, wrecking the engines and several cars; 1 trainman killed and 4 injured.

3d, p. m., on Central Pacific, near Lower Soda Springs, Cal., a butting collision between a work train and a light engine damaged both engines; one trainman fatally and 3 others less severely injured.

4th, early, on Buffalo, New York & Philadelphia, in Panama, N. Y., butting collision between two freights, piling up the engines and 25 cars in a bad wreck.

5th, early, on Baltimore & Ohio, in Wheeling, W. Va., butting collision between two freights, wrecked both engines and damaged several cars.

5th, on New York, Lake Erie & Western, near Millville, N. J., a butting collision between two freights badly wrecked both engines and several cars, and injured the engineer.

5th, on Pennsylvania, at Davidson, Pa., butting collision between a passenger train and a freight, doing some damage.

6th, p. m., on Cincinnati Southern, near Stockdale, Tenn., butting collision between two freights, wrecked both engines and several cars.

10th, on New York, Lake Erie & Western, near Bradford, Pa., a butting collision between two coal trains piled up the engines and 20 cars in a very bad wreck, injuring 3 trainmen.

11th, on New York, Pennsylvania & Ohio, at Warren, O., a passenger train ran over a misplaced switch and into the head of a freight train standing on a siding, wrecking the locomotives and injuring 2 trainmen.

14th, on Toledo & Ohio Central, near Rendville, O., butting collision between two freights wrecked both engines and several cars.

15th, on California Central, near Lamanda, Cal., butting collision between two freights, wrecking engines and several cars.

16th, on Western North Carolina, near Marshall, N. C., a butting collision between a passenger train and a freight, doing considerable damage and injuring 2 trainmen.

17th, on Pittsburgh & Lake Erie, at Sawmill Run, Pa., butting collision between two freights, doing slight damage.

18th, on Canadian Pacific, near Ivanhoe, Ont., butting collision between two freights, wrecking the engines and several cars.

19th, on Burlington & Missouri River, near Lincoln, Neb., butting collision between two freight trains. The wreck caught fire, and the engines and 17 cars were destroyed. A brakeman fatally injured.

20th, on Chicago & Northwestern, near Shopiere, Wis., butting collision between two freights wrecked both engines and several cars, engineer slightly injured.

20th, on New York, Lake Erie & Western, near Great Valley, N. Y., butting collision between two freights, wrecking the engines and several cars and injuring 6 trainmen.

20th, on Pittsburgh & Western, near Girard, O., butting collision between a freight train and a yard engine, badly damaging both engines and 6 cars.

20th, on Richmond & Danville, at Greer's Station, S. C., butting collision between a passenger train and a freight, doing considerable damage; 2 trainmen and 1 passenger killed and 10 passengers injured. It is said that the freight men miscalculated their time and used 20 minutes more of the passenger's time than they had been authorized to use.

21st, on Nashville, Chattanooga & St. Louis, near Whiteside, Tenn., a butting collision between two freights wrecked the engines and 12 cars, killing two tramps and injuring another.

26th, on Shenandoah & Allegheny, in Grove City, Pa., butting collision between a passenger train and a work train, damaging both engines.

29th, on Pittsburgh, Youngstown & Ashtabula, at Hiltown, O., butting collision between a passenger and a freight train wrecked both engines and several cars.

29th, on Pennsylvania, at Walton, Pa., butting collision between a freight train and a switching engine wrecked both locomotives and several cars.

30th, on Chicago, Milwaukee & St. Paul, at Byron, Ill., butting collision between two freight trains.

30th, on New York, Chicago & St. Louis, near Irving, N. Y., butting collision between two freights wrecked both engines and several cars; 2 trainmen killed and another fatally injured.

31st, on Richmond, Fredericksburg & Potomac, near Taylorsville, Va., butting collision between two freights, wrecking the engines and injuring 2 trainmen.

31st, on Pennsylvania, at Riverside, Pa., butting collision between a freight train and a light engine, wrecking both engines and several cars.

CROSSING.

8th, at the crossing in Whitehall, Ill., a Chicago & Alton passenger train ran into a Chicago, Burlington & Quincy freight, damaging an engine and several cars. It is claimed that the air brakes of the passenger train were defective.

DERAILMENTS.

DEFECTS OF ROAD.

11th, on Terre Haute & Peoria, near Decatur, Ill., freight derailed by the spreading of the rails.

15th, on Baltimore & Ohio, in Tiffin, O., 11 cars of a freight derailed by a defective switch and wrecked.

17th, on New York Central & Hudson River, at Sanborn, N. Y., several cars of a freight train derailed by a defective switch and wrecked.

20th, on Chesapeake & Ohio, near St. Albans, W. Va., 3 cars of a passenger train derailed by a defective switch and overturned, injuring 26 passengers.

20th, on Southern Pacific, near Rowen, Cal., freight derailed by spreading of rails, doing considerable damage and injuring a trainman.

27th, on Delaware, Lackawanna & Western, in New Hartford, N. Y., 15 cars of a freight derailed by a defective switch and piled up in a bad wreck.

27th, on Colorado Midland, near Florissouit, Col., a freight train was thrown from the track by a broken rail; 2 trainmen killed and another fatally injured.

27th, on Florida Railway & Navigation Co.'s road, near Tallahassee, Fla., passenger train derailed by a broken rail and 3 of the cars went over an embankment, injuring 5 passengers.

31st, on Richmond & Danville, near Lowell, N. C., a bridge over the Catawba River gave way under a passing freight, and several cars went down and were badly wrecked.

DEFECTS OF EQUIPMENT.

3d, on St. Louis & San Francisco, near Porter, Ark., engine of passenger train derailed by broken wheel; 1 trainman killed and 2 injured.

13th, on Ft. Wayne, Cincinnati & Louisville, at Poneto, Ind., several cars of a freight train derailed and wrecked by the breaking of an axle.

17th, on International & Great Northern, near Cactus, Tex., several cars of a freight wrecked by the breaking of a wheel.

18th, on New York, New Haven & Hartford, at Cos Cob, Conn., freight train derailed and wrecked by a broken truck.

26th, on Pennsylvania, near Thompson's, Pa., several cars of a freight derailed by a broken truck and wrecked.

26th, on Oregon Railway & Navigation Co.'s road, near Wallace, Or., several cars of a passenger train derailed by a broken axle.

27th, on Illinois Central, near Freeport, Ill., 8 cars of a Minnesota & Northwestern freight derailed by a broken brake-beam and badly wrecked.

31st, on Chicago & Eastern Illinois, in Clinton, Ill., several cars of a freight train derailed by a broken brake-beam.

NEGLIGENCE IN OPERATING.

2d, on Burlington & Missouri River, in Omaha, Neb., a freight train derailed by a misplaced switch.

3d, on Kansas City, Fort Scott & Gulf, in Miami, Kan., a passenger train derailed by a misplaced switch. The engine was overturned, injuring engineer and fireman.

4th, on St. Louis, Arkansas & Texas, at Bird's Point, Mo., several cars loaded with cattle in being let down an incline for the transfer steamer were thrown into the Mississippi River.

7th, p. m., on Alabama Great Southern, at Cuba, Miss., a passenger train derailed by a misplaced switch, damaging engine and baggage car.

8th, on Gulf, Colorado & Santa Fe, at Temple, Tex., a passenger train ran over a misplaced switch and the locomotive was overturned.

17th, on St. Paul, Minneapolis & Manitoba, near Petersburg, Dak., the engine and 11 cars of a stock train were derailed by a misplaced switch and piled up in a bad wreck, killing the engineer and injuring the fireman.

UNFORSEEN OBSTRUCTIONS.

3d, on Minneapolis, Sault Ste. Marie & Atlantic, near Gladstone, Mich., a work train running backwards struck a cow and was derailed, killing 2 trainmen.

4th, p. m., on Louisville, New Albany & Chicago, at Salem, Ind., a passenger train ran over a cow, derailling a car; conductor and a passenger severely hurt.

6th, night, on Dayton & Michigan, near Dayton, O., the engine and 4 cars of a freight were derailed by a purposely misplaced switch and tipped over.

8th, on Boston & Maine, in Gloucester, Mass., the engine and tender of a passenger train were derailed by a heavy chain which was being hauled across the track at a crossing.

10th, on Grand Trunk, near Fort Erie, Ont., a freight train ran over a cow, derailling 4 cars.

21st, on Camden, Gloucester & Mt. Ephraim, near Gloucester, N. J., passenger train derailed by a purposely misplaced switch.

23d, on Wabash Western, near Missouri City, Mo., a passenger train derailed at a point where the roadbed had been impaired by a washout, killing the engineer and injuring another trainman.

28th, on Chicago, Rock Island & Pacific, near Morris, Ill., the engine and 12 cars of a freight train were derailed by a telegraph pole which had been placed on the track by train-wreckers. Engineer and fireman killed and a brakeman injured.

30th, on New York, Lake Erie & Western, near Elk Station, N. Y., a freight train ran over a purposely misplaced switch, wrecking the engine and 13 cars.

UNEXPLAINED.

2d, night, on Central Vermont, near East Clarendon, Vt., several cars of a freight derailed and wrecked, blocking the road for some time.

6th, on Georgia Midland & Gulf, near Williamson's, Ga., several cars of a freight derailed and wrecked.

7th, early, on Columbus, Hocking Valley & Toledo, at Logan, O., engine and several cars of a coal train derailed on a bridge over the Hocking River, knocking it down, some cars falling with it into the river.

7th, on Augusta, Gibson & Sandersville, near Matthews, Ga., 4 cars of a mixed train derailed.

8th, on Cincinnati & Muskingum Valley, near Roseville, O., 3 cars of a passenger train derailed at a switch which had just been put in, one of them going over an embankment.

12th, on New York, Lake Erie & Western, at Hoboken, N. J., a car in a freight train jumped the track and 18 cars were derailed and wrecked, blocking the road for some time.

16th, on Denver, Texas & Ft. Worth, near Bellevue, Col., freight train derailed.

16th, on Pennsylvania, under Market street bridge, in Philadelphia, Pa., a freight train derailed, demolishing 5 cars and tearing away several supports of the bridge.

17th, on Missouri Pacific, near Denton, Tex., a freight train derailed and ditched.

18th, on Manhattan elevated, in New York City, a car of a passenger train derailed, injuring an employe.

22d, on Lake Shore & Michigan Southern, at Adrian, Mich., 8 cars of a freight derailed and wrecked.

23d, on Louisville & Nashville, near Nolan, Ky., freight train derailed.

23d, on St. Louis, Arkansas & Texas, near Greenville, Tex., several cars of a construction train derailed and wrecked; 3 laborers and a woman injured.

28th, on Union Pacific, in Omaha, Neb., freight train derailed.

29th, on Missouri Pacific, near Gainsville, Tex., freight train derailed.

30th, on Louisville & Nashville, near Birmingham, Ala., 6 cars of a freight derailed and wrecked.

OTHER ACCIDENTS.

4th, a. m., on Manhattan elevated, at Fifty-seventh street, New York City, engine of a passenger train broke a crank-pin.

10th, a. m., on Housatonic, near Brookfield Junction, Conn., the engine of a passenger train broke a driving-wheel.

10th, on Cincinnati, Wabash & Michigan, near Wabash, Ind., engine of a passenger train broke a connecting rod and was badly damaged.

31st, on Atlantic & Pacific, near Hackberry, Ariz., the boiler of a freight engine exploded, killing 3 trainmen.

The summaries will be found in another column.

TECHNICAL.

Locomotive Building.

Messrs. George Fleming & Co., St. John, N. B., are building two Moguls, with 18 by 24 cylinders, for the Cumberland Railway & Coal Co.

The Schenectady Locomotive Works, at Schenectady, N. Y., are erecting a new blacksmith shop 85 x 350 ft. The shop will be lighted by 840 incandescent lights.

The Car Shops.

The Louisville & Nashville road recently contracted with the Ensign Car Works, Huntington, W. Va., for 1,000 flat cars of 60,000 pounds capacity. The first of them have reached Louisville. They are 34 ft. long and heavily built.

The Elliot Car Co., of Gadsden, Ala., has three of their buildings about completed. The fourth and largest building is going up and the engines and boilers are all in position.

The car works at Fullerton, Lehigh County, Pa., have resumed operations after being idle two years, and the new plate mill at the same place will start up soon, giving employment to several hundred hands.

The Fitchburg Railroad Co. is building at its shops, in Charlestown, Mass., 16 standard passenger coaches, 100 stock cars, 34 ft. long; 500 box cars of the same length, and 100 double hopper bottom gondola cars. The latter will be

fitted with an improvement consisting of covers for the hoppers made of $\frac{1}{2}$ in. steel plate, which may be used when cars are not to be unloaded over a trestle, thus making it easier to shovel from. The gondolas will also be equipped with the Jewett truck. The form of coupler to be used is not yet decided.

Bridge Notes.

Bids are requested for the bridge across the Cumberland River. Address Pineville Land & Iron Co., Pineville, Ky.

Mr. W. H. Law, Peterborough, Ont., has his works full of bridge building work. The new bridge at Thamesville, built by him, consisting of one span of 164 ft., two of 64 ft. and a 16-ft. roadway, is being put up. The bridge at Galt, consisting of two 70-ft. spans, one 73-ft. span, 16-ft. roadway and 5-ft. sidewalk, is now ready for use.

A railroad bridge will be built across the Youghiogheny at Sutersville, Pa. The projector is Hon. W. L. Scott, the coal operator.

The Philadelphia, Wilmington & Baltimore will build a bridge at Crum Lynne, Pa.

The county commissioners will build a bridge between Dayton and Otego, Minn.

The county commissioners will build a bridge over the Saluda River at Easley, S. C.

The county commissioners will build a bridge at Menominee, Mich. Cost, \$70,000.

The commissioners will build a bridge at Hornellsville, N. Y.

The county commissioners will build a bridge at Dublin, Ga.

The county commissioners will build a bridge at Fultonham, O.

The Rochester Bridge & Iron Works have been awarded the contract for the construction of a bridge at Rochester, N. Y.

The King Iron Bridge Co., of Cleveland, O., has been awarded the contract for the construction of a bridge at Calais, Me.

Manufacturing and Business.

The Minister of the Colonies at the Hague wants tenders for taps, pumps, pipes and other similar articles intended for the use of the Sumatra railroads.

J. F. O'Shaughnessy, of New York, and W. E. Kay and C. P. Goodyear, of Brunswick, Ga., have incorporated the Brunswick Co., with a capital stock of \$5,000,000. The company is privileged to engage in mining and manufacturing.

The Ingersoll Rock Drill Co. reports shipment of two more Ingersoll eclipse drills to Bi-Metallic Mining Co., Granite, Mont. The U. S. Depository Mining Co. have been supplied with "straight line" air compressor, two eclipse drills, and boiler complete, for driving their 800 ft. tunnel.

E. S. Greeley & Co., of New York, manufacturers of railroad and telegraph supplies, have just issued a useful catalogue containing engravings of the Brooklyn Bridge, a bird's-eye view of New York and vicinity, and street maps of New York, Philadelphia, Baltimore and Washington.

Anderson & Barr have ordered from the Clayton Air Compressor Works, New York, two No. 4 Duplex air compressors, to be used in sinking the caissons for the Mississippi River bridge at Cairo, Ill.

The Jacksonville Mining & Manufacturing Co. has been chartered at Jacksonville, Ala., with a capital of \$1,500,000.

The Janney coupler is to be applied to 1,000 freight cars now building for the New York, Lake Erie & Western.

The works of Edward Kendall & Sons, builders of engines and machinery, Cambridgeport, Mass., were burned Sunday evening, Nov. 20. The fire is supposed to have been incendiary. Loss about \$75,000, covered by insurance.

Iron and Steel.

The South Tredegar Iron Works, of Chattanooga, Tenn., recently closed a contract with the Macon & Palatka Railroad to furnish 1,200 tons of iron splices and spikes, sufficient to equip 286 miles of road. The price agreed upon was \$40,000.

Bolckow, Vaughan & Co., England, are making 10,000 tons of steel rails for the railway between Gelelvara and Lulea for the development of the Swedish iron ore mines.

The contract for 2,100 tons of cast-iron water pipes for the Boston Water Board has been awarded to the McNeil Pipe & Foundry Co., of that city. The total amount of the bid was \$92,477.

The Cunningham Iron Works Co., of Boston, has been awarded the contract for ten 72-in. steam boilers for the Hamilton Wcolen Co., of Amesbury, Mass.; also four 72-in. boilers for the Hartford Electric Light Co.; also a stand-pipe, containing 400 tons of plate steel, for Council Grove, Kan.

The Phoenix furnace, of Brown, Bonnell & Co., Youngstown, O., is being relined and a number of improvements added. It is one of the oldest furnace plants in the Mahoning Valley, and will be put in blast early the coming month.

Carnegie, Phipps & Co., Limited, have completed plans and will at once let the contract for a large cogging mill for cogging down ingots to beam shapes at Homestead. The mill will be driven by a reversing engine of 40 in. diameter and 54 in. stroke, and will enable the firm to run to full capacity on the finishing of beams and give facilities to double the production of beams at Homestead. Rails are also being prepared for rolling beams on the present rail train, from 12 in. down. When these improvements are completed, in May next, the steel beam capacity at Homestead will be fully 300 tons per day.

Owing to the dull state of the steel rail market the Bessemer steel-works and Rensselaer rail mill at Troy, N. Y., have closed indefinitely. This action throws 1,200 operatives out of work.

The Duquesne Steel Works on the Monongahela River will begin operations Dec. 1 with sixty men and will produce 100 tons of pipe per week. The product will chiefly be steel boiler tubes and lap-weld wrought-iron tubes.

The Colorado Coal & Iron Co. have almost completed, a line of railroad to their coal properties up Rock Creek, and intend to locate 100 ovens on Carbonate townsite. A syndicate of capitalists have purchased 40 acres of land north of the town for extensive steel works and blast furnaces.

The Minnesota Iron Co. has been reorganized, and the capital stock increased from \$1,000,000 to \$1,400,000.

The entire property owned by the Rover Iron Co., at Roanoke, Va., including a narrow gauge railroad, was sold last week by the commissioners for \$300,000 to Wm. Welsh for a syndicate.

The Rail Market.

Steel Rails.—Prices vary in different sources, but a close quotation of the current trade can be placed at \$32.50@\$33 at mill.

Old Rails.—The market is dull, no business of consequence being reported. Inquiries are said to be in the market for lots of 2,000 and 3,000 tons of doubles. Nominal quotations may be made at \$22 for tees and \$22.50@\$23 for double heads.

Track Fastenings.—Spikes, 2.25@2.40c.; angle bars, 2.05@2.15c.; bolts and nuts, 3@3.25c.

Scrap.—Market quiet, prices unchanged. No. 1 American wrought scrap can be quoted at \$20.50@\$21 from yard.

"L'Exposition Universelle de 1889."

In the *Railroad Gazette*, Oct. 28, was published a letter from an esteemed correspondent at Paris describing in vigorous language the swindle perpetrated as the "Exposition du cinquantenaire des Chemins de Fer," and assuming that the same enterprising rascals would have control of the Universal Exposition proposed to be held at Paris in 1889. This statement is corrected by the *Journal des Transports* as follows:

"The general exposition of 1889 is under the official patronage of the government. It is controlled by a commission of 43, which includes the Frenchmen most prominent in financial and manufacturing interests. The great railroad companies have pledged themselves to take an active and liberal part, and there are many and undoubted guarantees of success.

"We hope, therefore, that the bad advice of the Paris correspondent of the *Railroad Gazette* will not affect the decision of American manufacturers, and that they will not hesitate to exhibit in 1889, under the protection and patronage of the French government, the railroad appliances of which they are so justly proud and which we shall not be the last to admire."

Steel Workers' New Scale of Wages.

The steel workers' new scale for 1888, which is to go into effect on the 1st of January, fixes prices for wages by the ton and day, and has been so arranged that every workman in a steel mill, outside of common labor, has been provided for. There has nearly always been a special scale for steel workers, but it only embraced little more than half the skilled work in a steel mill. In the scale for 1888 an increase, amounting to about 10 per cent. all around, will be asked for, except on a few points in which it will be considerably more. The new scale calls for work to be paid for by the hour or day, which is a movement toward doing away with the contract system more than the one-job system.

New Steamships.

Messrs. Harland & Wolff, of Belfast, have been finally instructed to commence the construction of a gigantic steamship for the White Star Line. Her length is to be 565 ft., and breadth 52 ft., with twin screws and engines of 15,000 horse-power. The name of the vessel will be the *Majestic*. An order for a vessel of 7,000 tons has also been placed with Messrs. Laird Bros., of Birkenhead, by the Hamburg American Co. The vessel will be constructed entirely of steel, and will be provided with ten water-tight compartments.

THE SCRAP HEAP.

An Exhibition in Belgium.

An international exhibition is to be held at Brussels next year. The following statement of the aims and scope of the exhibition are interesting and have the merit of being unintelligible to ordinary mortals:

"The programme of the exhibition, which gives the basis of the enterprise, shows that there is a marked difference between this and former exhibitions. The object of the exhibition is in reality to enable the products utilized for any given purpose to be judged under prescribed conditions. Therefore each object will represent the solution of a problem, or at least an approach to this solution. Being conceived on this basis, it is hoped that the exhibition will give tangible and practical results, and that whatever these results may be, the promoters of the scheme will be able to prevent producers and inventors from making useless experiments by laying down for them the lines on which they are to proceed towards a given object. The aim of the enterprise is to that extent praiseworthy. The scheme consists of two parts, viz., an international competition and a universal exhibition. It is under the patronage of the King of the Belgians, and his brother, the Count of Flanders, is honorary president. The promoting committee consider it necessary to stimulate progress in all branches of industry by emulation, in order to effect an improvement in trade and to make the effect of the exhibition lasting."

The one thing evident is the sanguine character of the promoters of this exhibition. A body of men who hope to prevent producers and inventors from expending their money in making useless experiments deserve a monument and free passes on a special train for Utopia. A stock company has been formed to carry out these philanthropic ideas and propose to avail themselves of the assistance of an American switch-back railroad. Whether this line is accompanied on its travels by a portion of Mauch Chunk Mountain is not stated, but the latest advices show that the Lehigh Valley road is still running.

Among other American exhibits will be the original Pullman sleeper used by Washington during his first term, a Third Avenue uptown car on the elevated road about 6 p. m. with real brakemen and passengers. In the back ground will, it is stated, be a group in wax of the Manhattan directors declaring that the dividends are so meagre that the public will have to stand.

It is, however, understood that the promoters have abandoned their intention of having a competitive exhibit of butcher boys and line brakemen, as blasphemy in Flemish is very oppressive, and is liable to damage the crops.

On the Boston & Maine.

Self-assertive female.—That poor child's breath smells so of whisky that it fills the whole car. You've been drugging it, you wretch.

Traveler (in a husky whisper)—Madam, would \$10 be any object for you to sit down? The Fraternity Club is going to give a little dinner in Portland to-night, and this kid is full of liquor. But the kid's made of rubber. See?—Pack.

Railroad Mail Service.

The report of the Superintendent of the Railway Mail Service, just submitted, calls attention to the following facts: During the year just ended there were 244 derailments or wrecks of trains on which postal clerks were employed. In these wrecks three clerks were killed. Two other clerks met accidental death while in the discharge of their official duties. In addition to these fatalities, 45 clerks were seriously and 72 slightly injured. Fifty clerks were so badly injured that acting clerks were provided by the department to keep up their runs. The salaries of such acting clerks amounted to \$7,000. In addition to those mentioned, acting clerks had to be provided for 13 clerks injured during 1886, who were not able to resume service at the commencement of the fiscal year, the amount paid on account of the casualties occurring in 1886 being \$4,800. "These men," says Superintendent Nash, "met disability and death in their country's service as truly as ever patriot met his fate on the field of battle, and in view of the constant dangers which threaten them, it seems that Congress should make some provision for their care in case of total disability, or for those dependent upon them in case of death. The recommendations of the Postmaster-General in his report for the fiscal year ended June 30, 1885, seem both just and humane, and well deserve a place in our statutes."

The recommendation of Postmaster-General Vilas was that the government should provide a superintendent and clerk, at government expense, to receive and take care of a fund, to be raised by monthly contributions of a small sum from each postal clerk, to be used in making moderate provision for the dependents of clerks who die in the service, and to those who are disabled.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings of the stockholders of railroad companies will be held as follows:

Boston & Albany, annual meeting, Boston, Dec. 14.

Fort Worth & Denver City, annual meeting, at the office, Fort Worth, Tex., Dec. 13.

Georgia Pacific, annual meeting, at the office, Birmingham, Ala., Nov. 30.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Western Society of Engineers* holds its regular meetings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m., on the first Tuesday of each month.

The *New England Railway Club* meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.

The *Boston Society of Civil Engineers* holds its regular monthly meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday of each month.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, on the third Thursday of each month.

The *Western Railway Club* meets in Chicago the third Wednesday in each month.

The *American Society of Mechanical Engineers*, eighth annual meeting, Philadelphia, Pa., Nov. 28 to Dec. 2, at the Continental Hotel.

The *American Society of Civil Engineers* meets at its rooms, 127 East Twenty-third street, New York, the first and third Wednesday of each month.

The *Engineers' Club of St. Louis* meets the first and third Wednesday of each month till June.

The *Central Railway Club* meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Boston & Albany, quarterly, \$2 per share, payable Dec. 31.

Catawissa, semi-annual, $3\frac{1}{4}$ per cent. on preferred stock.

Chicago, Burlington & Quincy, quarterly, 2 per cent.

Lehigh Coal & Navigation Co., semi-annual, 2 per cent.

Boston Society of Civil Engineers.

A regular meeting was held at the society's rooms, Boston & Albany Railroad Station, Boston, on Nov. 16. President Rice was in the chair, 59 members and 25 visitors present. The record of the last meeting was read and approved. Mr. Charles E. C. Breck was proposed for membership by Messrs. J. H. Curtis and F. W. Hodgdon.

The Committee on Weights and Measures submitted a report on the communication from the Western Association of Architects asking the co-operation of the society in an effort to secure the introduction of the metric system and suggesting a "concert of action in bringing the matter to the attention of Congress at its next session, and that the effort for the present be limited to securing the adoption of the metric system by all the departments of the government for all government business."

The Committee recommended that a canvass of the society be made to ascertain the opinions of the members on the proposition submitted by the Association of Architects. On motion of Mr. Brackett the report was accepted and the recommendation adopted.

Mr. Arthur V. Abbot, Chief Engineer of the National Super-Heated Water Co., of New York, gave a very full description of the plant now being built by the Boston Heating Co. A full size section of the street mains, with its expansion joint, house-connection and other parts of the system were exhibited and explained in detail.

Accounting Officers' Meeting.

The Accounting Officers will hold a special meeting to discuss the methods of settling joint freight accounts at the Grand Pacific Hotel, Chicago, on Dec. 7, at 10 a. m.

Conductors' Convention.

The *Railway Passenger and Freight Conductors' Mutual Aid and Benefit Association* finished its 13th annual convention in Chicago this week. The following officers were elected: President, J. V. Mallory; First Vice-President, C. A. Loomis; Second Vice-President, E. A. Sherman; Secretary and Treasurer, Charles Huntington. Arrangements were completed for the excursion of the delegates to Vera Cruz and return. They left in their special through train on Nov. 20.

PERSONAL.

—E. H. Goodman has resigned the position of Second Vice-President of the Pullman's Palace Car Co.

—Col. J. W. Sloss has resigned as President of the South & North Alabama and the Nashville & Decatur railroad companies.

—F. N. Finney, the Managing Director of the Wisconsin Central, will withdraw from all connection with the company on Jan. 1.

—Michael Rickard, who was appointed by Gov. Hill, of New York, last week, to be Railroad Commissioner in place of J. D. Kernan, resigned, has been a locomotive engineer on the New York Central & Hudson River road for over 20 years. The appointment was urged by the Brotherhood of Locomotive Engineers and other labor and trade organizations throughout the state. Mr. Rickard was nominated for commissioner last spring, but his name was rejected by the Senate. The Legislature is not now in session. There are now three Republicans and no lawyer on the Commission.

—Col. L. P. Grant, President of the Western Railway of Alabama, declined a re-election at the annual meeting last week, and was retired with the thanks of all concerned for his services in office, and regrets that he had determined to close his successful management of the road. Colonel Grant was one of the pioneers of railroad building in Alabama and Georgia. In 1845 he was the engineer in charge of the construction of the Montgomery & West Point Railroad, and Atlanta, his present place of residence, was a wilderness when he first ran the lines for a railroad through the place.

ELECTIONS AND APPOINTMENTS.

Baltimore & Ohio.—The following directors were elected this week: James Sloane, Jr., Charles F. Mayer, James L. McLane, William Keyser, William F. Burns, Robt. Garrett, T. Harrison Garrett, James Carey Coale, George W. Dobbin, John Gregg, George A. Von Lingen and Decatur H. Miller. The first four named succeed Aubrey Pearre, John K. Cowen,

W. W. Taylor and Joshua P. Harvey, and represent the New York and London syndicate.

Buffalo, Rochester & Pittsburgh.—The old board of directors was re-elected this week.

Chesapeake & Ohio.—J. T. Odell has been appointed General Superintendent. The office of Superintendent of Transportation has been abolished.

Chicago, Burlington & Quincy.—F. B. Sanford has been appointed Traveling Passenger Agent, with headquarters at Detroit, Mich. H. D. Badgley has been appointed New England Passenger Agent, with headquarters at Boston, vice W. S. Conde, resigned.

Chicago, Milwaukee & St. Paul.—Edward S. Keeley has been appointed Division Freight Agent, office at Milwaukee, vice John H. Bayle, assigned to other duties. He has charge of the following divisions: Chicago & Milwaukee, Racine & Southwestern in Wisconsin and Illinois; Chicago & Council Bluffs in Illinois and Iowa, and the new Kansas City line.

Chicago & Northwestern.—B. J. Reynolds has been appointed passenger agent in Chicago.

Chicago, St. Paul, Minneapolis & Omaha.—W. A. Scott has been appointed General Superintendent.

Duluth & Iron Range.—G. H. White has been appointed General Superintendent, with headquarters at Two Harbors, Minn.; R. Angst, Chief Engineer, headquarters Two Harbors; A. H. Viele, Auditor, with headquarters at Duluth.

Duluth, Red Wing & Southwestern.—F. W. Hoyt, of Red Wing, Minn., has been elected president.

Fort Worth & Denver City.—R. G. Duncan has been appointed General Superintendent.

Indiana Midland.—J. Long has been appointed Master Mechanic. The shop will probably be located at Noblesville, Ind.

London & Northwestern, of England.—C. A. Barattini has been appointed General Passenger and Freight Agent for the United States and Canada; office, 3 Broadway, New York.

Louisville & Nashville.—Andrew Broadbuss has been appointed General Freight Agent of the Louisville, Cincinnati & Lexington division, and Horace F. Smith Assistant General Freight Agent.

Minnesota & Northern.—The incorporators of this Minnesota company are: E. U. Smith, J. P. Moutlan and Gen. D. Dayton, Worthington; Neil Currie, of Currie; Daniel Shell, Worthington; J. M. Dickson and H. P. Lewis, of Fulda; A. H. Drake and O. K. Rakness, Avoca; A. Fierome, J. F. Schneider and J. A. Maxwell, of Currie.

Mobile & Ohio.—The following directors were elected this week: Adrian Iselin, Jr., H. B. Plant, Sidney Shepard, Alexander H. Stevens, James H. Fay, R. K. Dow, J. P. McMahon, Henry Hall, William Butler Duncan, T. Green Bush, W. L. Hearin, E. L. Russell and T. M. R. Talcott. Of these three are new members: R. K. Dow, who takes the place of Charles Walsh, deceased, and T. Green Bush and W. L. Hearin, who succeed Peter Hamilton and D. P. Bestor, retired.

Monadnock.—Henry K. French has been elected President and Dr. J. H. Cutler, Treasurer.

Montgomery & Florida.—The following officers and directors were elected last week: Stewart L. Woodford, Brooklyn, N. Y.; N. T. Sprague, Brooklyn; T. F. Thompson, David M. Bood, New York; M. P. LeGrand, James A. Farley, J. D. Roquemore, M. F. LeGrand, Jr., and H. C. Moses, of Montgomery, Ala. N. T. Sprague, President; Dr. M. P. LeGrand, Vice-President; Gen. Stewart L. Woodford and Col. John D. Roquemore, Attorneys; Mr. S. D. Hubbard, Secretary and Treasurer.

Nashville & Charleston.—The incorporators of this Tennessee company are: William L. Breyfogle, George B. Cowlan, Isaac S. Wenslandley, Charles H. Gibson, William C. Wenslandley, Adolph Montandon and Albert S. Marks.

Naugatuck.—At the meeting in Bridgeport, Conn., last week, the old officers and board of directors were re-elected with the exception that J. J. Wetmore succeeded S. S. Dennis, deceased, as a director. The road is leased to the New York, New Haven & Hartford.

New Haven & Derby.—William H. Stevenson has been re-elected President. J. A. Bostwick, W. H. Starbuck and J. L. McCauley have been elected members of the Executive Committee.

New York Railroad Commissioner.—Michael Rickard has been appointed Commissioner, in place of John D. Kernan, resigned.

The Commission organized at Albany this week with William E. Rogers as Chairman.

Newport & Yaquina.—The incorporators of this Oregon company are: A. J. Ray, A. J. McMillan, H. J. Young and W. S. Hafford.

Old Colony.—The old board of directors was re-elected this week.

Pacific in Nebraska.—Edward Barrington has been appointed General Superintendent and Chief Engineer.

Pullman's Palace Car Co.—H. H. Sessions has been appointed Manager of the Pullman Works.

St. Augustine & North Beach.—The incorporators of this Florida company are: William J. Jarvis, John T. Dismukes and Joseph Slater.

Visalia & Tulare.—The incorporators of this California company are: J. Goldman and E. A. Braly, of Tulare; Jasper Harrell, V. D. Knapp, G. A. Bottsford and Thos. Creighton.

Western Railway of Alabama.—Cecil Gabbett has been elected President.

OLD AND NEW ROADS.

Albemarle & Pantego.—The road is now being surveyed from Roper to Pantego, N. C.

Atchison, Topeka & Santa Fe.—Tracklaying on this road between Atchison, Kan. and St. Joseph, Mo., commenced at the latter place last week. The grading is about completed, and the road will be in operation by Jan. 1. Four hundred men are working on the line.

This company is building a six-mile road from Coldwater Cañon to the Palms in California.

Austin & McGregor.—It is proposed to incorporate this company to build a road from Austin to McGregor, Tex.

Baltimore & Ohio.—At the stockholders' meeting this week, the action of the directors in subscribing to the stock

and bonds of the Grafton & Greenbrier road, running from Grafton to Belington, Md., 41 miles, was ratified, and also to the stock and bonds of the Wheeling & Pittsburgh, which will be included in the consolidation mortgage as additional security.

Boston, Concord & Montreal.—E. H. Rollins, President of the company, tried to take possession of this road at Concord, N. H., last week, and was prevented from so doing by W. A. Stowell, Superintendent in charge of the road under the Boston & Maine management. Mr. Rollins demanded its surrender to the stockholders on the ground that the lease to the Boston & Lowell had been broken by subletting the road to the Boston & Maine. The matter will be taken into court.

Boston & Lowell.—The clerk of the Circuit Court at Portsmouth, N. H., began this week to take testimony in the bill in equity of the Boston, Concord & Montreal against the Boston & Lowell to set aside the lease of the former to the latter corporation.

Buffalo, Rochester & Pittsburgh.—Arrangements have been made for the removal of the company's shops from Rochester, N. Y., to Carry, Pa. The shops employ 500 men.

Burlington & Missouri River.—The Cheyenne, (Wyo.) extension will be completed in about two weeks. The line joins the main stem at Holdrege, Neb.

California & Oregon.—The road will be open for business about the middle of December. There will be 14 miles of track to lay after the tunnels are finished.

Canadian Pacific.—James Whitehead, contractor, has taken action against the Dominion Government for \$500,000, for breach of contract, respecting operations on this road between Port Arthur and Duluth.

Central of Georgia.—Wright & Brothers, of Birmingham, Ala., have the contract to build the Clayton extension from Clayton to Ozark, Ala., 40 miles.

Central Massachusetts.—The last span of the bridge across the Connecticut River is nearly completed and will be in readiness for the opening to Northampton, Dec. 1. General Superintendent Mellen and other officials of the Boston & Lowell made the run from Ware to Boston (75 miles), over the line, Nov. 17, in two hours.

Chicago, Burlington & Quincy.—The system will be extended into Wyoming territory next year from two directions, northward from Cheyenne to the Broken Bow extension, while the latter will strike the Platte River near Fort Laramie, follow up the Big Laramie and Little Laramie to the Laramie plains and thence up the Sweetwater River almost to Idaho. It is presumed that this will be the main line of the Burlington to a connection with the Central Pacific.

Chicago & Eastern.—Articles have been filed in Illinois recording the consolidation of the Chicago & Eastern Illinois, the Strawn & Indiana State Line and the Chicago, Danville & St. Louis roads, under the above name.

Chicago, Madison & Northern.—The track will be laid from Freeport, Ill., to Madison, Wis., by Dec. 20, and trains will be put on the line on Jan. 1. The tunnel at Belleville, Ill., is to be finished this week.

Chicago, Rock Island & Pacific.—The Denver extension is under contract to be completed to Phillipsburg, Kan., by Jan. 1, and is surveyed to Granger, Col., on through that point to Colorado Springs.

Chicago, St. Paul & Kansas City.—This road, commonly known as the Diagonal, has been extended across the Missouri state line and is now within 55 miles of St. Joseph, and it is expected to reach the latter place by the middle of December.

Chino Valley Narrow Gauge.—A survey is being made for a road from Chino to Ontario, San Bernardino County, Cal.

Cincinnati, Hamilton & Dayton.—A petition has been filed in Cincinnati by this company against Henry S. Ives et al. to cancel what is known as the Ives issue of preferred stock, amounting to \$4,600,000. The allegations are that the stockholders authorized the board of directors to issue \$10,000,000 of preferred stock at their discretion, but the discretion was never exercised by the board, and no authority was ever given to any of the officers of the company to issue such preferred stock; but that George Stayner and Henry S. Ives did unlawfully issue sundry certificates for various amounts of preferred stock. All such certificates, the plaintiff alleges, were spurious, and the plaintiff claims that it is entitled to an order for their cancellation. The defendants in the suit are all those persons who hold any of this stock.

Cincinnati, New Orleans & Texas Pacific.—A fire in the company's shops at Ludlow, Ky., last week, destroyed the round-house, machine shops and about 150 loaded cars that were standing on the track. Loss, \$250,000.

St. Paul & Duluth.—The new cut off from Thompson to Grassy Point, Minn., 12½ miles, was completed last week.

Duluth, South Shore & Atlantic.—There have been 70 miles of track laid westward from Nestoria, Mich., leaving 90 miles to be built to bring the road to Duluth, Minn. Tracklaying is proceeding both ways from Dogwood, Mich., eastward to connect with the already completed track to the Sault Ste Marie, and westward to connect with Nestoria.

Durham & Northern.—P. Lineham & Co., of Raleigh have commenced work on their 22 miles of road from Durham and Henderson, N. C.

East Tennessee, Virginia & Georgia.—It has come to light that this company is behind the Tennessee Midland the company which has been trying to obtain county subscriptions to build a road from Knoxville to Memphis, via Nashville and Jackson. It is believed that the East Tennessee will surrender its lease of the Memphis & Charleston, which road it had intended to extend to Chattanooga, and will build the Tennessee Midland instead. It will give a more direct route to Memphis.

At the annual meeting last week the report for the year ending June 30 was submitted, showing the following results:

Gross earnings	\$4,368,180
Expenses	2,901,228
Net earnings	\$1,466,952
Deduct taxes	112,463
Interest on bonds	\$1,354,489
Surplus	1,027,360
	\$327,129

Included in the operating expenses are extraordinary disbursements for maintenance of way and equipment aggregating \$212,621, which, added to the surplus above shown, \$327,129, makes \$539,750 over and above fixed charges for

the year, out of which was paid a dividend of 4 per cent. on the first preferred stock.

A supplemental report for the first three months of the current year ending Sept. 30 shows gross earnings, \$1,237,138; net, \$433,205. These three months last year covered 23 per cent. of the business of the entire year. Assuming this ratio for the current year would give: Net earnings for the entire year, \$1,800,000; interest on bonds, \$1,027,000; surplus for the first and second preferred stock, \$773,000.

Eufaula & St. Andrews Bay.—W. H. Reeves, of Eufaula, Ala., President of this company, has just returned from Europe after an absence of six months, and is said to have completed arrangements for building the road. The line will extend from Eufaula to Saint Andrews Bay, Fla., 150 miles.

Fitchburg.—The Superintendent of Public Works at Albany, N. Y., has received from this company a request for permission to dig a basin and build a wharf on the Erie Canal, a quarter of a mile west of lock 25, at Rotterdam Junction, 30 miles west of Albany. The canal is 250 ft. wide at this point, and the contemplated harbor of the railroad will be 200 ft. wide by 2,000 ft. long. The wharf will be furnished with a steam elevator for grain and large sheds for other freight, so that eastbound grain and merchandise can be transferred to the railroad.

Flint & Pere Marquette.—The company has purchased the Port Huron & Northwestern, a narrow gauge line extending from East Saginaw to Port Huron, Mich., 91 miles, with three branches to Sand Beach, Port Austin and Almont. It will be changed to standard gauge next year. With its new acquisition the Flint & Pere Marquette will have a line from Lake Michigan to the St. Clair River. The terms of the sale have not been announced.

Florida & Georgia Air Line.—This company has been incorporated in Florida. The purpose is to build a road from Palatka to the Georgia state line, where connection will be made with the new line extending south from Macon. Joseph F. Dean, of Palatka, is at the head of the enterprise.

Florida Improvement & Construction Co.—Chartered at Jacksonville, Fla., for the purpose of building railroads, canals and bridges. J. R. Tyson, E. W. Henck and J. M. Schumacher are interested.

Hepzibah & Hawkinsville.—This road has been chartered in Hepzibah, Ga.

Illinois Central.—The company has completed 58 miles of track from Freeport, Ill., to Madison, and the road was opened between Rockford, Ill., and Madison, this week. The section between Chicago and Rockford will not be completed before next Spring.

Indiana Midland.—Tracklaying is in progress between Ladoga, Ind., and Waveland.

Kansas City, Memphis & Birmingham.—The work of grading and bridging the Aberdeen Branch of this road has been completed to the east bank of the Tombigbee River, and tracklaying was begun at Amory, Miss., last week. Trains will be running into Aberdeen by Dec. 15.

Kansas City & Omaha.—This road, a branch of the St. Joseph & Grand Island, has been finished as far as it will be constructed this season. The line is now 86 miles long, extending from Fairfield, Neb., where it leaves the main line, to Alma, Neb.

Kansas City & Pacific.—The track will be completed from Grant Centre to Kinkaid, Kan., by Dec. 1.

Kansas City & Sabine Pass.—A mortgage has been filed by this company in favor of the Union Trust Co., of New York, for \$2,485,000. The mortgage covers the entire property and contains a clause which allows the mortgagee to take control of the road as trustee if on examination it finds the road is not being properly managed. This is the road projected from Kansas City, Mo., to Sabine Pass, Tex., a distance of 700 miles.

Knoxville Southern.—The company has let a contract for three miles, and the locating engineers are busy preparing estimates for the remainder of that portion of the road between Knoxville and the Little Tennessee River, and in a few days this part will be put under contract.

Lawrence, Atchison & Southern.—Contracts are to be let soon for the first 50 miles of this Kansas road.

Lincoln, Red Oak & Des Moines.—There will be a special election in Lincoln, Neb., next month on the proposition to subscribe \$150,000 in bonds to aid in building the road.

Louisville & Nashville.—Morris & Newman, of Indianapolis, Ind., have received the contract to build this company's car shops at Decatur, Ala. There will be 14 buildings, each 150 to 200 ft. in length.

Lowell & Hastings.—This road is completed from Lowell to Freeport, Mich.

Macon Air Line.—P. F. Hurst began work on this road at Albany, Ga., last week. He will build 26 miles.

Mahoning & Shenango Valley.—A temporary injunction has been granted to prevent this company from building a proposed line in Trumbull County, O. The Lake Erie & Western and other companies assert that the Lake Shore & Michigan Southern desires to construct a road from a point in Trumbull County, five miles from Youngstown, and near Doughton, to a point on the state line of Ohio and Pennsylvania, and not having power or authority of law to build such railroad or to appropriate lands its officers have conspired with Chauncey H. Andrews, Thomas W. Sanderson, Myron A. Norris, Henry O. Bonrill, Fayette Brown and Ralph J. Wick, who are defendants, to accomplish the purpose. In order that it might in disregard of the laws exercise the power of eminent domain, it has secured the persons mentioned except Brown to create the above named company.

Martinsburg & Potomac.—This road, running from the Potomac River to Martinsburg, W. Va., was sold last week to Col. Thomas R. Kennedy, of Chambersburg, Pa., for \$65,000. The purchase was made in the interest of the Cumberland Valley road.

Minnesota & Northwestern.—Articles of incorporation filed in Minnesota for the purpose of building a road beginning in the southeastern part of the state on the Iowa boundary line northward via Worthington, Currie and Fergus Falls, and thence to the boundary line of Minnesota and Manitoba. Capital stock, \$5,000,000.

Minnesota & Northwestern.—The track of the Kansas City line is now laid 105 miles from Des Moines, Ia., or within 54 miles of St. Joseph, Mo. On the Dubuque & Freeport line tracklaying has been completed with the exception of 4 miles. The tunnel on this line will be completed early in January.

Minneapolis, Sault Ste. Marie & Atlantic.—The road has been completed from Minneapolis, Minn., to Glad-

stone, Mich. The surfacing will require several days. Trains will be running through to Sault Ste. Marie on Dec. 1.

Missouri Pacific.—The statement of the earnings and expenses of this company for the nine months ending Sept. 30, 1887, submitted to the stockholders, is as follows:

Gross earnings (including St. Louis, Iron Mountain & Southern), 3,258 miles	\$15,520,928
Operating expenses	9,126,339
Net earnings from traffic	\$6,004,589
Interest accrued on bonds for nine months ending Sept. 30	\$3,446,110
Taxes paid	186,114
Rentals	64,411

Total.....\$9,797,954
Three quarterly dividends.....2,238,614

Surplus.....\$159,340
Additional income received from shares and bonds of express, and other companies.....1,273,935

Surplus for nine months.....\$1,433,293

Mobile & Navy Cove.—A number of Western capitalists, including Gen. John McNulta, Receiver of the Wabash, have been in Mobile, Ala., this week, looking into the merits of the proposed road to connect that city with Navy Cove, a deep water point on the eastern shore of Mobile Bay, 35 miles distant.

Montana Central.—This road, which is the Helena (Mont.) connection of the St. Paul, Minneapolis & Manitoba, has just been completed to the latter road, thus giving a through line between Helena and Minneapolis. Through trains were put on between the two cities on Nov. 21.

Nashville & Charleston.—This road has been chartered at Nashville, Tenn.

New Haven & Derby.—Work on the extension of the road to a connection with the New York & New England will be begun about Dec. 1, and the track laid to Hawleyville, Conn., inside of 6 months.

Newport & Yaquina.—The company has been incorporated in Oregon. Capital stock, \$100,000.

New Roads.—A new narrow gauge road is projected to run from Patzquaro, Mex., on the line of the Mexican National to a point in the state of Guerrero on the Pacific Ocean.

New York, Lake Erie & Western.—The company has begun building a new iron bridge over the Hackensack River, N. J., to be completed next February. It will be a two armed Pratt truss, centre bearing, with double tracks. Its length will be 1,500 ft., with 180 ft. draw.

New York, Mahoning & Western.—Work was begun on this road at Findlay, O., last week. The whole line between Youngstown, O., and Decatur, Ind., is under contract and will be ready for tracklaying next summer.

New York & Massachusetts.—Before work was begun on the Poughkeepsie Bridge Mr. Coan, of Massachusetts, bought the Poughkeepsie & Eastern road and changed its name to the above. When the bridge became a certainty the bridge company tried to buy the road, but Mr. Coan refused to sell. The bridge company then decided to locate the approaches of the bridge so as to lead away from the New York & Massachusetts road, but at the same time to parallel it and to connect with the Hartford & Connecticut Western. John F. Winslow, a stockholder in the bridge company, has now begun suit to enjoin the company from changing its original route, averring that his interests will be jeopardized if this is done. He asks that the bridge company be compelled to follow out the original plan and connect with the New York & Massachusetts.

New York, New Haven & Hartford.—The report of this company to the Connecticut Railroad Commission (including Air Line, Shore Line and branches) for the fiscal year ending Sept. 30, 1887, is as below:

	1887.	1886.	Inc. or Dec.	P. c.
Gross earnings.....	\$7,890,209	\$7,601,946	I.	3.8
Operating expenses.....	5,526,830	4,911,759	I.	12.5
Net earnings.....	\$2,363,379	\$2,690,187	D.	12.1
Passengers carried.....	9,261,426	8,267,316	I.	13.2
Tons freight carried.....	2,602,157	2,376,195	I.	9.4

After declaring the usual 10 per cent. dividend there was a surplus of \$203,901, against \$583,239 last year.

The decrease in net earnings is due to the improvements being made upon the road.

New York & New England.—The annual report of this company gives the following statistics.

	1887.	1886.	Inc.	P. c.
Gross earnings.....	\$4,903,284	\$4,612,633	I.	6.3
Operating expenses.....	3,178,853	2,908,529	I.	9.2
Net earnings.....	\$1,724,431	\$1,704,104	I.	2.8

A dividend of 7 per cent. on the preferred stock has been paid. The surplus now stands at \$512,002. The operations of the Norwich & Worcester are included in these figures.

Northern Pacific.—The company will refuse to obey the order of the Minnesota Railroad Commissioners to reduce its passenger rates from 4 to 3 cents a mile, and will resist any attempt to enforce it by appeal to the Federal courts. The ground taken is that its charter comes from the National Government, and that state laws have no authority over it.

Work on the Spokane & Palouse branch in Washington territory is being pushed. Track is laid for 20 miles, and the road is graded for 108 miles. It is believed that the company will carry out its intention to build a road into the Coeur d'Alene country next year.

Vice-President Oakes denies the extensively circulated statement regarding a consolidation of this company with the Wisconsin Central, or a traffic arrangement, between them. There has never been a suggestion by either company of any such arrangements.

Ohio River.—The track has been extended from Guyandotte, W. Va., north 28 miles to a point 12 miles below Pt. Pleasant. The bridge over the Kanawha River at Pt. Pleasant will be completed on Jan. 1, when the line will be opened.

Old Colony.—At the annual meeting this week a resolution was adopted to the effect that the directors shall obtain such legislation as may be necessary to authorize the lease of the Boston & Providence road to this company; the lease when agreed upon to be submitted to the stockholders for approval.

The company's branch between Brockton and Easton, Mass., will be opened for business about Jan. 1. It will be known as the West Bridgewater branch.

Pennsylvania.—Mayor Cleveland has vetoed the resolution passed by the Jersey City Board of Public Works, permitting the elevation of this company's tracks through Railroad avenue in that city. In his objections he says that the resolutions adopted by the Board of Works are virtually a contract with the railroad company by which the city

covenants to permit the elevation of the tracks, the lowering of the grades of the street crossings and the vacation of Greene street, and to maintain the company in the privileges thus granted. The Mayor suggests that the resolutions should be so drawn as to let the responsibility of defending suits for damages rest upon the company and not upon the city. He also objects to a proviso which permits the company's chief engineer and the chief engineer of the city to change the plans at their pleasure.

The railroad company says, in reference to the veto, that no further action will be taken about the elevation of tracks, but that it will build a depot at Harsimus Cove.

The business of all lines east of Pittsburgh and Erie for the month of October has been as follows: Gross earnings, \$4,989,518, an increase of \$252,170 over the corresponding month last year; expenses, \$3,269,531, an increase of \$391,929; net earnings, \$1,719,987, a decrease of \$139,759. The 10 months of 1887 as compared with the same time last year was as follows: Gross earnings, \$46,043,197, an increase of \$4,439,562; expenses, \$30,196,552, an increase of \$3,427,498; net earnings, \$15,846,645, an increase of \$1,012,064. All lines west of Pittsburgh and Erie for the 10 months of 1887 show a surplus over all liabilities of \$1,316,413, being a gain as compared with the same period last year of \$1,144,589.

Pensacola & Memphis.—It has been settled that work shall begin upon this prospective road at Pensacola, Fla., before Dec. 15.

Philadelphia & Reading.—At a meeting of the Reconstruction Trustees in Philadelphia on Nov. 21, Wayne MacVeagh, representing the British Association for the Protection of Holders of American Securities, presented the claims of London people interested in the organization of the Perkiomen Railroad Co., one of the Reading's leased lines, and urged that in the reorganization more liberal terms be granted. The committee on reorganization of the Perkiomen Railroad consented to modify the plan as follows: The second series bonds of \$1,450,000 are to be issued in exchange for the present outstanding issue of consolidated mortgage or sterling bonds, to bear 5 per cent. interest per annum. Instead of 4 per cent. interest per annum, as stated in Article IV. of the plan of reorganization, the Perkiomen Railroad Co., through the trustee with whom the bonds are to be deposited, is to pay to the holders of the certificates representing the consolidated mortgage or sterling bonds deposited under the plan of reorganization on Dec. 1, 1887, the interest due upon the bonds on that date, as well as that which matured on June 1, 1887, at the rate of 6 per cent. per annum. The consolidated mortgage or sterling bonds already deposited will be accorded the same terms. The Pennsylvania Co., for insurances on lives and granting annuities, will receive deposits of the consolidated mortgage or sterling bonds until Dec. 10, 1887, under the plan of reorganization as amended without penalty, and thereafter until Dec. 20, 1887, only on the payment of a penalty of 5 per cent. upon the par value of the bonds.

The Reading Reconstruction Trustees approved the modifications and voted to make the terms binding and operative upon the securities already deposited.

The company is said to have arranged to extend its Colebrookdale branch to Churchville, Berks County, Pa.

Red River Valley.—The contract between the Manitoba government and H. S. Holt, the contractor, for the completion of the road has been ratified. The government undertakes to complete the right of way and finish the grading, facing and bridging, also to furnish ties and put the contractors in peaceable possession of the line.

St. Augustine & East Coast.—This company has been chartered in Florida to build a road from St. Augustine to Daytona, Fla.

St. Augustine & North Beach.—The company has been incorporated in Florida to build a road from St. Augustine about 6 miles. Capital stock, \$100,000.

St. Louis & Cairo Short Line.—Tracklaying on the Marion extension of this road, which is to be extended from Marion, Ill., through Williamson, Johnson and Massac counties to Paducah, Ky., has been completed to Burnside Junction, 13 miles north of Vienna, Ill. The road will be finished within a year.

San Francisco & San Joaquin Valley.—It is thought that this company will soon be consolidated with the Atchison, Topeka & Santa Fe. The road, as surveyed, extends from Antioch, Cal., along the western side of the San Joaquin Valley, through Fresno and Tulare counties, and thence through a portion of Kern County to a connection with the Atlantic and Pacific, near Mojave. Engineers and surveyors have been in the field for nearly a year. The survey has practically been completed, and the line is now ready for grading and tracklaying. But little of this latter work has been done, operations having been confined to the Tejon Pass, which it is proposed to hold against invasion by the Southern Pacific or other companies. The San Francisco & San Joaquin and the Atchison are known to be in affiliation with one another. It is rumored that work will begin at Antioch on Dec. 1.

Shenango & Allegheny.—The road will be extended from Greenville, Pa., to Amasa, where connection will be made with the Lake Shore & Michigan Southern and the New York, Pennsylvania & Ohio.

Shreveport & Arkansas.—This road, which is building from Lewisville, Ark., to Shreveport, La., will be finished in January. Track is laid 13 miles south of Lewisville, and nearly all the grading is completed.

Southern Pacific.—The yard men of this road at Houston, Tex., struck last week for a 25 per cent. increase of wages, and the company has declared their places vacant. No attempt was made to interfere with the working of trains. Writs of restraint and injunction were issued by the United States Circuit Court directed against the striking switchmen, restraining the strikers from trespassing upon the company's premises and property, and commanding them to appear before the Circuit Court at Galveston on Dec. 6, and show cause why an injunction shall not be issued pending the company's suit for damages against the defendants.

All work has been suspended on the Lake County branch from Rutherford, Cal., for the reason, it is reported, that a compromise has been made with the McNulta syndicate, which has a road projected through that section.

Texas Construction Co.—This company has been organized in New York to build the Texas, Sabine Valley & Northwestern road. Office at Longview, Tex.

Visalia & Tulare.—This company has been incorporated in California with a capital stock of \$100,000.

Wabash.—The reorganization of the company has been virtually completed. The first mortgage bondholders are to be paid in cash with interest on their overdue coupons to Nov. 1. The second mortgage bondholders will receive new first mortgage bonds with interest and the consolidated mortgage bonds and the 7 per cent. of 1879 will receive the face value of their holdings in new first mortgage bonds. On fore-

closure, the lines east of the Mississippi River will be consolidated with the Wabash Western, which comprises the lines west of the river that were bought by the purchasing committee. The new company will issue two new mortgages. The first one will be for \$34,000,000 and will cover all the lines of the consolidated company. Of this issue, \$11,741,000 will be reserved to meet the present mortgage bonds of the Wabash Western. The second mortgage will cover all the lines east of the Mississippi. It will be for \$14,000,000, and the old second, the consolidated mortgage, the 7 per cent. of 1879, and the car trust certificates are convertible into the new second. Both mortgages will be for 50 years from Nov. 1, and will bear 5 per cent. interest.

Western New York & Pennsylvania.—The New York company formally organized this week and consolidated with the Pennsylvania corporation, which was formed about ten days ago. The same directors and officers before reported were elected for the entire company.

Western Railway of Alabama.—The Montgomery & Selma Division, 50 miles, is to be relaid with steel rails.

Wisconsin Central.—This company's docks at Ashland, Wis., have shipped a total of 200,308 tons of iron ore this season. The shipments were commenced late.

TRAFFIC AND EARNINGS.

Export Rates.

The joint committee of the Trunk lines and the Central Traffic Association held a meeting on the 18th in New York and decided to reduce export rates to a level with those announced in Chicago by the Grand Trunk, which are 3 cents below those made by the trunk lines, that being the amount of differential which the Grand Trunk claims that it has a right to allow. Commissioner Fink was authorized to issue new tariffs at any time, provided he deemed it necessary to do so in order to meet the rates made by the Grand Trunk.

The tariff of through rates from Chicago and western points to European ports has already made trouble, large shippers in the West preferring to ship to the seaboard at regular rates when they can save money by taking such action and making in connection therewith a contract on their own account with the ocean carriers; and it is reported some of the trunk lines have already given notice that they will not use the through tariff.

The Grand Trunk on Saturday announced lower rates on fresh meats to Boston, as follows:

Dressed beef and sheep, 52 cents; hogs in refrigerator cars, 52½; dressed hogs in common cars, 48½. This is a reduction of 6 cents from the first tariff issued by the Chicago & Grand Trunk and 12½ cents from the old established rates.

On Tuesday of this week the other roads out of Chicago met these rates, and reduced live stock rates also, announcing a tariff based on the following rates to New York: Cattle, 28½ cents; sheep, 32½ cents; hogs, 30 cents; horses and mules, 60 cents; dressed beef, sheep and hogs in refrigerator cars, 52½ cents; dressed hogs in common cars, 48½ cents.

Inter-state Commerce Commission.

The Inter-state Commission began on Nov. 21 to hear the complaints of George Rice, of Marietta, O., against a number of railroads, alleging against some discrimination in favor of the Standard Oil Co., against others violations of the long and short haul provisions, and against all unreasonable and unjust rates. There are 13 petitions in all, but only 10 of the cases are being tried at this time. The following railroad companies were represented: Louisville & Nashville, Mobile & Ohio, Newport News & Mississippi Valley, New Orleans, Louisville & Texas, Mississippi & Tennessee, Illinois Central, Cincinnati, New Orleans & Texas Pacific, St. Louis, Iron Mountain & Southern and the East Tennessee, Virginia & Georgia. A general denial was made of unreasonable charges and violations of the long and short haul provision, and the alleged discrimination was explained upon the theory that the Standard Oil Co. furnishes its own tank cars, while the complainant ships in barrels in the company's cars, thereby creating a substantial difference of circumstances and conditions.

Virgil Powers, ex-Commissioner of the Southern Railway & Steamship Association, testified to the belief that the rate per hundred pounds should be the same whether the oil is carried in tanks or barrels. His further testimony tended to show that tank cars recorded as of a given capacity in reality were considerably larger. Fifty-one tank cars which had been weighed showed an aggregate capacity of 44,000 lbs. more than the recorded capacity upon which charges were based. Since the present inspection system was established the association has effected a saving of between \$60,000 and \$70,000 by reweighing freight cars, this saving being upon all kinds of freight.

Mr. Howard Page, representing the Standard Oil Co. in Kentucky, testified on Nov. 22 that no drawbacks were allowed his company by the roads south of the Ohio. Tank cars were loaded on their return trips from the South with turpentine and cotton-seed oil. The cost of handling barrels and the trouble from leakage from them was enlarged upon. Box cars, after being once saturated with oil, were undesirable for other freight.

J. M. Culp, General Freight Agent of the Louisville & Nashville, testified in regard to rates on oil. He said certain rates were posted in the stations which other evidence tended to show were not so posted. His statements regarding the prices charged Mr. Rice were also controverted by letters produced in evidence.

The Freight Bureau of the Omaha Board of Trade complains that the Chicago, Burlington & Quincy, the Chicago & Northwestern, the Chicago, Milwaukee & St. Paul, and the Chicago, Rock Island & Pacific roads charge a rate from Chicago to Lincoln, Wahoo, Fremont, Beatrice, and Blue Springs, Neb., which is much less than the combined rates from Chicago to Omaha, and thence to the Nebraska points named. For example, the rate on first-class freight from Chicago to Lincoln is \$1, from Chicago to Omaha 90 cents, and from Omaha to Lincoln 33 cents. The complainant avers that Chicago is largely benefited to Omaha's detriment, and that the latter should be justly deemed the chief distributing point for west-bound traffic for the state of Nebraska.

The Commission decided on Nov. 21 the case of E. B. Raymond against the Chicago, Milwaukee & St. Paul. The complaint was that the company had established rates on a branch line unreasonably high and diverted business to towns on the main line. The answer of the company was that the branch line rates were reasonable, but that it had been compelled by competition to make rates too low on the main line. A synopsis of the opinion by Commissioner Morrison is as follows: When the act to regulate commerce took effect the grain and flour rate to Chicago from Minneapolis, Red Wing and Lake City, on the main line of the Chicago, Milwaukee & St. Paul, was 15 cents, and from Mazepa, a station on the narrow gauge branch of said road, it was 17 cents. When these rates have been reduced to 7½ cents and 12½ cents the Commission will not, upon the evidence afforded by a comparison between them, declare 12½ cents from Mazepa an unreasonable and unlawful rate under the first section of the act. Rates and charges not unreasonably high of themselves can be so adjusted in their relations

to each other as to give undue preferences and produce the unreasonable advantage which the third section of the law makes unlawful. If a railroad in establishing charges on different divisions and branches, so adjusts them as to divert trade and business to one locality, which naturally would go to another, such preference for one place and disadvantage to another is not excused or made lawful by the fact that some of such charges are not entirely voluntary. In the adjustment of the reduced rates, Mazonia, which had been 2 cents, is 5 cents higher than its rivals—a difference sufficient to divert some of its legitimate business; and the road is directed to reduce this difference to 2½ cents by reducing the Mazonia rate from 12½ cents to 10 cents.

Cotton.

The cotton movement for the week ending Nov. 18 is reported as below, in bales:

Interior markets:	1887.	1886.	Inc. or Dec.	P. c.
Receipts	220,610	177,304	I. 43,222	24.3
Shipments	182,844	157,911	I. 24,933	15.7
Stock	384,594	337,180	I. 47,414	14.1
Seaports:				
Receipts	284,816	268,596	I. 16,220	6.0
Exports	195,677	113,675	I. 82,002	72.2
Stock	767,586	864,325	D. 96,739	11.1

The coal tonnage of the Pennsylvania road for the week ending Nov. 12 is reported as follows:

	Coal.	Coke.	Total.
Line of road	236,874	81,440	318,314
Year to Nov. 12	8,450,536	3,125,616	11,576,152
To Nov. 12, 1886	7,429,034	3,030,180	10,459,214

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

Month of October:	1887.	1886.	Inc. or Dec.	P. c.
Cour d'Alene	\$18,034			
Net	9,689			
Mar., Col. & Nor.	6,830	\$2,804	I. 4,026	143.7
Net	3,618	1,087	I. 2,531	113.6
Month of September:				
Atlanta & Charles	\$124,357	\$100,186	I. 24,171	24.1
Beech Creek	62,717	53,977	I. 8,740	16.1
Bruce & West	28,166			
Central of N. J.	1,042,420	1,095,503	D. 53,083	4.7
Charles & Sav.	38,508	34,936	I. 3,572	10.1
Ch-r-w & Darl.	11,468	7,740	I. 3,728	48.4
Ches & Lenor.	6,539	6,212	I. 327	5.2
Gr. B. W. & St. P.	37,330	33,740	I. 3,590	10.3
Ind. Ill. & Iowa	17,423	13,178	I. 4,245	17.0
Jett. T. & K. W.	28,701	2,936	I. 25,765	14.7
Knox & Ohio	41,029	35,765	I. 5,264	14.7
Min. & St. L.	129,720	151,625	D. 21,905	16.1
N. Y. Sus. & W.	131,623	102,817	I. 28,806	27.4
North'm (S. C.)	54,354	43,428	I. 10,926	25.1
Omaha & St. L.	36,631	34,632	I. 1,999	4.5
P. Royal & Aug.	33,164	26,762	I. 6,402	24.8
P. Hal. & W. C.	27,058	16,553	I. 11,105	66.7
Rich. & Peter.	18,863	18,633	I. 230	1.2
Seab'rd & Roan.	65,638	46,067	I. 19,571	42.9
South Carolina	142,257	101,819	I. 40,438	39.6
Spalt. Un. & Col.	7,174	5,788	I. 1,386	23.8
Wih. Col. & Aug.	79,434	55,433	I. 24,001	43.3
Total	\$2,132,371	\$2,011,670	I. 120,701	5.9
Month of September:				
Cairo, V. & Chic.	\$65,837	\$58,525	I. 7,312	12.4
Net	26,920	14,519	I. 12,401	85.5
Cape F. & Y. V.	28,637	20,580	I. 8,057	38.8
Net	14,329	10,389	I. 3,940	37.8
Central of N. J.	1,042,420	1,095,503	D. 53,083	4.8
Net	489,007	552,591	D. 63,584	15.1
Chi., Bur. & No.	173,082			
Net	36,348			
E. Ten. Va. & G.	255,308	245,523	I. 9,785	3.9
Net	101,937	90,822	I. 11,115	12.1
Mexican National	139,337	132,255	I. 7,082	5.3
Net	14,749	11,803	I. 2,946	14.9
Oregon Imp. Co.	362,443	286,569	I. 75,874	26.4
Net	10,196	92,173	D. 81,977	19.5
Oreg. R. & N. Co.	487,248	558,006	D. 70,758	12.3
Net	227,959	303,244	D. 75,285	24.8
Knox & Ohio	41,029	35,765	I. 5,264	14.7
Net	14,745	8,682	I. 6,063	69.9
Total (gross)	\$2,422,217	\$2,420,733	D. 1,484	.1
Total (net)	979,842	1,093,223	D. 113,381	10.3
Three months—July 1 to Sept. 30:				
Boston & Albany	\$2,545,124	\$2,361,126	I. 183,998	7.7
Net	1,181,957	1,095,666	I. 86,291	7.9
Brooklyn Elev.	145,975	130,066	I. 15,909	12.2
Net	48,919	39,532	I. 9,387	23.7
Burr. R. & P.	584,320	583,563	I. 757	.1
Net	180,911	126,568	I. 54,343	42.9
C. I. St. L. & C.	707,105	695,636	I. 11,469	1.6
Net	285,867	283,193	I. 2,674	.9
Del., Lacka. & W.	2,119,309	1,763,508	I. 355,801	20.1
Net	1,132,273	1,066,684	I. 65,589	6.1
E. Ten. Va. & G.	1,370,494	1,090,237	I. 280,257	25.7
Net	470,613	412,389	I. 58,224	14.4
Hart. & Conn. W.	102,187	110,227	D. 8,040	7.2
Net	46,738	52,731	D. 5,993	11.3
Knox & Ohio	120,686	86,967	I. 33,719	38.7
Net	24,658	19,233	I. 5,425	28.2
Manhattan	1,953,457	1,815,634	I. 137,823	7.5
Net	870,742	800,992	I. 69,750	8.0
N. Y. Ch. & St. L.	1,160,255	905,104	I. 255,057	27.1
Net	243,494	238,197	I. 5,297	2.1
Oreg. R. & N. Co.	1,310,386	1,437,968	D. 127,582	8.9
Net	606,867	682,537	D. 75,670	11.0
Rome, W. & O.	973,340	849,577	I. 123,763	14.5
Net	491,106	427,762	I. 63,344	14.8
San A. & Aran. P.	171,566			
Net	62,016			
Third Av. Elev.	1,316,853	1,382,959	D. 66,106	4.7
Net	342,656	290,853	I. 51,804	17.6
Total (gross)	\$14,409,501	\$13,013,666	I. 1,395,835	10.7
Total (net)	5,926,371	5,500,320	I. 426,051	7.6
Four months—July 1 to Oct. 31:				
Cleve. & Canton	\$138,976	\$135,521	I. 3,455	2.5
Net	50,205	32,428	I. 17,777	54.8
Nash. C. & St. L.	1,066,530	876,254	I. 190,276	21.7
Net	490,049	365,008	I. 125,041	34.2
Six months—April 1 to Sept. 30:				
Cape F. & Y. V.	\$128,171	\$101,400	I. 26,771	24.4
Net	57,326	44,616	I. 12,710	28.5
Ch. H. & Day	1,713,536	1,508,035	I. 205,501	13.5
Net	754,593	608,586	I. 146,007	24.4
Nine months—Jan. 1 to Sept. 30:				
Cairo, V. & C.	\$557,884	\$470,430	I. 87,454	18.5
Net	181,314	106,187	I. 75,127	70.7
Cape F. & Y. V.	103,684	100,244	I. 3,440	3.4
Net	91,201	78,429	I. 12,772	16.2
Central of N. J.	8,626,374	7,729,723	I. 896,651	11.6
Net	4,113,446	3,249,887	I. 863,559	26.5
Chic., Burl. & N.	1,786,415			
Net	447,763			
C. I. St. L. & C.	1,992,832	1,898,204	I. 94,628	4.8
Net	774,079	740,439	I. 33,640	4.5
E. Ten. Va. & G.	1,029,348	2,981,643	D. 1,952,295	19.2
Net	1,029,884	927,392	I. 102,492	11.0
Mexican Nat.	1,283,721	1,271,204	I. 12,517	.9
Net	158,829	233,710	D. 74,881	32.0
Oreg. Imp. Co.	2,971,431	2,144,741	I. 826,690	38.5
Net	814,961	548,987	I. 265,974	48.4
Oreg. R. & N. Co.	3,361,305	3,769,281	D. 407,976	4.6
Net	1,502,671	1,610,327	D. 107,656	6.6

Ten months—Jan. 1 to Oct. 31:

	1887.	1886.	Inc. or Dec.	P. c.
Atch. T. & S. F.	15,295,395	12,724,747	I. 2,570,648	20.2
Atlantic & Pac.	2,159,183	1,221,481	I. 937,702	76.7
Burr. C. R. & No.	2,400,968	2,335,860	I. 65,108	2.7
California South.	1,182,197	694,032	I. 488,165	108.9
Central of Iowa	1,076,977	1,073,043	I. 3,934	.8
Chi., St. L. & P.	4,765,623	3,933,689	I. 831,934	21.0
Cin. N. O. & T. P.	2,755,339	2,348,583	I. 416,756	17.8
Ala. Gt. South.	1,252,164	953,793	I. 298,371	31.2
N. Ori. & N. E.	546,293	496,565	I. 49,728	10.0
Vicks. & Mer.	430,644	297,505	I. 133,139	87.5
V. Shre. & F.	447,340	380,191	I. 67,149	17.6
Total, C. N. O.				
T. & P.	5,431,782	4,568,510	I. 863,272	18.8
Cin. Rich. & Ft. W.	342,964	314,913	I. 28,051	8.9
In. Wash. & B.	1,813,091	1,639,698	I. 173,393	10.5
Ch. C. & Ind.	3,734,569	3,413,673	I. 320,896	9.4
Cleve. & Canton	\$311,479	\$296,427	I. 15,052	5.0
Net	89,963	69,147	I. 20,816	30.0
Col. & Cin. Mid.	271,004	267,351	I. 3,653	1.3
Den. & R. G. W.	954,222	851,663	I. 102,559	12.0
Det. B. C. & Alp.	404,073	188,668	I. 215,405	11.4
E. Tenn. Va. & Ga.	4,291,738	3,438,220	I. 853,518	24.8
Flor. Ry. & N. Co.	836,213	753,589	I. 82,624	10.9
Georgia Pacific	972,292	652,643	I. 319,649	48.7
Gr. Rap. & Ind.	1,574,610	1,084,719	I. 489,891	17.4
Louis. & Nash.	14,958,819	13,968,833	I. 989,986	7.0
Hous. & Tex. C.	2,262,246	2,241,638	I. 20,608	.8
Ind. Lec. & Spr.	477,796	345,290	I. 132,506	38.4
Keok. & West	261,078	218,750	I. 42,328	19.3
Lehigh & H.	198,871	177,686	I. 21,185	11.9
L. R. & M.	672,671	570,303	I. 102,368	18.0
Long Island	2,792,295	2,593,315	I. 198,980	7.6
Lou. Ev. & St. L.	821,539	701,044	I. 120,495	17.1
Louis. & Nash.	13,084,567	11,421,757	I. 1,662,810	14.5
Ma. q. H. & O.	943,630	884,285	I. 59,345	6.7
Nash. C. & St. L.	2,523,810	1,957,057	I. 566,753	28.7
Net	1,131,073	782,203	I. 348,870	44.7
Ohio & Miss.	3,435,724	3,205,259	I. 230,465	7.1
Ohio River	237,600	159,534	I. 78,066	61.4
Pitts. & West.	1,602,213	1,278,607	I. 323,606	22.1
St. L. A. & T.	2,060,967	1,373,309	I. 687,658	50.9
St. P. M. & Man.	6,670,101	5,948,604	I. 721,497	12.5
Shenandoah Val.	741,778	615,246	I. 126,532	20.7
Stat. Isl. Rap. T.	750,566	693,591	I. 56,975	8.2
Total	\$100,039,586	\$86,243,164	I. \$13,796,422	16.0

Early reports of monthly earnings are usually estimated in part, and are subject to correction by later statements.

Anthracite Coal Tonnage.

For the month of October, 1887, and the year ending Oct. 31, the anthracite coal tonnage, as reported by John H. Jones, Official Accountant, was as follows, the statement including the entire production of anthracite coal, excepting that consumed by employes and for steam and heating purposes about the mines:

	October.	For year.	For year.
Phila. & Reading	732,082	727,441	6,148,339
Central of N. J.	390,891	534,237	4,942,340
Lehigh Valley	328,002	606,244	5,030,278
Del., Lack. & West.	699,040	550,020	4,777,566
Del. & Hud. Canal Co.	392,347	372,763	3,185,942
Pennsylvania	550,377	350,237	3,098,402
Pennsylvania Coal Co.	177,538	166,110	1,274,347
N. Y. L. E. & W.	64,421	71,124	628,935
Total	3,185,298	3,512,178	28,186,749

The stock of coal on hand at tidewater shipping points, Oct. 31, 1887, was 158,976 tons; on Sept. 30, 1887, 394,748 tons; decrease, 235,772 tons.

Traffic Notes.

The slight cutting in passenger rates from St. Louis eastward, which was begun by the Ohio & Mississippi a week or two ago, still continues, and rates have now been reduced by the Wabash and the Bee Line.

Lake freight rates, which have been up to 5½ cents per 100 lbs. on wheat from Chicago to Buffalo, and within a week or two have dropped to 2½, have now again risen to 3½, with a prospect of going higher. The approach of the close of navigation apparently occasions these wide and frequent fluctuations.

The Massachusetts Commission, in deciding a complaint against the Boston & Albany for taking up a Rochester-to-Boston ticket as soon as the passenger left Albany, and giving him a check therefor, says that the road is justified in making a rule providing for such action, because if the ticket were left in the passenger's hands the road would have no voucher on which to demand its money from the seller of the ticket. The rule, however, should be printed on the original ticket. The Board refers to the recent action of the National General Passenger and Ticket Agents' Association on uniform tickets, and in view thereof makes only a mild recommendation.

ANNUAL REPORTS.

Mobile & Ohio.

This company reports for the fiscal year ending June 30, 1887. The total mileage operated was 663 miles, including the St. Louis & Cairo line of 161 miles. In comparing the results of operation for 1887 with 1886 the St. Louis & Cairo is not included, as this road was operated but five months in the fiscal year of 1886-6. Moreover, the change of gauge was not completed until late in November, 1886. The comparisons are for 503 miles of the Mobile & Ohio for 1886-7, against 527 for 1885-6. The Columbus and the Starkville branches, 26 miles, were operated the last fiscal year by the Georgia Pacific, and the revenue appears in the miscellaneous receipts.